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ESSAYS AND DISCUSSIONS.

OPTIC NEURITIS FROM INTRA-NASAL DISEASE.

By DERRICK T. VAIL, M.D.,
CINCINNATI, OHIO.

Oculist to Cincinnati Hospital and German Deaconesses Hospital; Clinical Lecturer, Ophthalmology, Miami Medical College, Etc.

THE thin shell of bone separating the orbital tissues on the one side from the nasal structures on the other has subserved the purpose of a true and impervious boundary wall between the eye and the nose.

The structures, functions and purposes of the eye and its auxiliary tissues are so very different from those of the nose that some oculists disdain such an apparently alien neighbor as the nose; and, on the other hand, a few rhinologists boast of knowing as little of the eye as of the bones of the foot.

A true boundary between the eye and the nose does not in reality exist; on the contrary there is a very intimate connection. Beside mere contiguity, there are abundant and open nervo-lympho-vascular relationships, so that we should regard the innervation, the lymph and blood circulation of the eye and those of the nose together and not apart. The nasal branches of the trigeminus nerve supplying the ethmoidal, sphenoidal and frontal sinuses are offshoots of the ophthalmic branches of the same nerve lying within the orbit. The arterial supply and the venous drainage of the upper accessory sinuses are really part and parcel of the ophthalmic system of arteries and veins. The lymph channels of the nasal attic drain into the orbit where they anastomose with the perivascular, perineural and peribulbar spaces; anatomical points which should open our eyes to the fact that the upper pneumatic cells of the nose and the important soft tissues of the orbit are intimately and inseparably associated.

Kuhnt says: "The orbit is surrounded on three sides by accessory nasal cavities lined with mucous membrane, the veins from which empty directly into the ophthalmic veins."

Since this paper deals more particularly with the sphenoidal cell in relation to optic neuritis, it will do no harm to make a tour of inspection of this cavity. After considerable difficulty we find the narrow opening leading into the cavity of the sphenoidal body. We crawl through the small entrance and drop inside. It is dark, stuffy and quite unattractive. The single window admits of no air current, there being no counter-opening. Its irregular walls are lined with glistening, thin and pale mucous membrane, which is almost entirely devoid of glands. We hear the ominous and rhythmical rush of arterial blood as it courses through the large vessels lying just beyond the confines of the cavity. We note the low musical whirr of venous blood circulating through the ophthalmic vein and the cavernous sinus. The quiet nasal respiration of the Gulliver whose sphenoidal caves we Lilliputs are exploring, sounds like the mighty roar of a tornado. The cavity echoes and augments the sound. The guide points to the irregular ceiling and tells us that just on the other side of the thin covering of the sphenoidal cell lies the optic chiasm. He touches the outer wall near the ceiling with his Alpine stick and announces that the optic foramen is there, and that the optic nerve at that point lies against the cell-wall itself. He tells us that the wall here is exceedingly thin and in some cases membranous. He warns us not to lean on the outer wall, for we might compress the ophthalmic vein or tickle the fifth nerve, or irritate the third, fourth or sixth nerves which pass just on the outside.

We perceive at once that if this gloomy, stuffy, illy-ventilated cell should become infected with pus-formers, resulting in abscess, or even if it became the seat of a less violent but infective inflammation, the important outlying ocular structures would be in real jeopardy. In the former case the lateral wall of the cell might become swollen or even bulging. Perhaps there would be more or less pinching of the nerves and vessels passing through the optic foramen and the sphenoidal fissure. A neuritis from compression would result. In the latter case some of the infection existing in the stroma of

the mucous membrane lining the ethmoidal and sphenoidal cells might be taken up by the venous and lymph circulation to be carried into the larger channels of the orbit. This would mean infection and swelling of the orbital lymph spaces, sluggish circulation in those spaces and even stasis, and the subdural lymph space of the optic nerve would, in some cases at least, become affected. Thus a true interstitial optic neuritis might result. Pain in and around the eye would in many cases be a prominent symptom, due either to direct compression of the ophthalmic division of the fifth nerve where it passes through the sphenoidal fissure, or reflexly from the sinusitis via the anterior and posterior ethmoidal nerves—branches of the ophthalmic. Septic matter taken up by an open vein may be carried from the nose into the veins of the orbit, where in certain cases septic thrombosis would result. Hajek points out that even the cavernous sinus has become infected from the upper nasal veins. Thrombosis of the orbital veins has resulted after nasal operations where sepsis of the wound occurred and even where the galvano-cautery was used on the turbinates.

* * * * * *

We all know how common acute coryza is. We recognize and expect it to be an accompaniment of grip, measles, whooping-cough, etc. We are familiar from personal experience with the distressing nasal and head symptoms, and often remark on the profuse rhinorrhœa that indicates the "breaking up" of the cold.

Modern authorities claim that sinusitis very frequently exists in those cases. The causes for acute sinusitis mentioned in the new text-books (Shurly, L. Brown, P. Brown, Kyle, *et al.*) are influenza, the acute exanthemata, infection from nasal operations, the retention of secretions from nasal packings, etc. Grip is conceded by all to be the most potent cause. Frankel, of Hamburg, found acute sinusitis to be present in *all* of one hundred and forty-six patients dead from grip. In not a single case was sinusitis diagnosed. Weichselbaum, of Vienna, performed many post-mortem examinations on patients dead from grip and makes the statement that 90 per cent. had sinusitis.

It is fortunate that the front wall of the sphenoidal cavity

is usually the thinnest and gives way first, otherwise acute retrobulbar neuritis and blindness would be much more common.

I leave it to an abler pen than mine to tell us how to make a positive diagnosis of *acute* sinusitis. I frankly admit that I am anxious and willing to be taught both how to recognize it and how to cure it.

At any rate we must concede that acute empyema of the ethmoidal and sphenoidal cells does occur as well as necrosing ethmo-sphenoiditis, and from that concession we can safely argue that we have a well-founded cause for acute retrobulbar neuritis and all the alarming accompaniments.

If rhinologists will grant that pus confined within the cells of the ethmoid and sphenoid would cause inflammation, thickening and bulging of their orbital walls or infection of their lymph spaces, oculists will, I think, be able to produce a *causus morbi* for certain curious and acute retrobulbar inflammations affecting the optic, the fifth and sometimes the third and sixth nerves.

In case of erosion, thickening or bulging of the lateral wall of the sphenoidal cavity, in certain cases we would have at first compression of the optic nerve and some choking of its foramental part. This would be resented by the soft and easily insulted nerve fibers and their fine capillaries and lymph spaces, and the result would soon be a true interstitial neuritis with some distention of the vaginal sheath in front of the optic foramen (and not behind it in the chiasm). The neuritis would extend toward the ball, since it would be the distal end which would suffer from such strangulation. In the phenomenon which follows putting a tight rubber band around the finger, all the swelling is on the distal side of the rubber, and so in case of strangulation of the optic nerve at the apex the inflammation would extend forwards, thus producing a monocular optic neuritis. Other stages would follow in rapid succession—transudation, plastic exudation, complete arrest of function, and finally atrophy and fibrosis, which would obliterate the finer markings of the nerve, destroying endoneurium, perineurium, and neuraxons alike.

The question might here be asked: "In acute retrobulbar neuritis, is there a true choked disc?" The answer is, "No,

the artery and vein of the disc enter the optic nerve only about 10 or 15 mm. behind the globe; at that point there is a free enough inlet for arterial blood and an outlet for venous blood to prevent that." The throttling of the optic nerve is at the foramen, an inch farther back.

* * * * * *

A certain quiet type of monocular optic neuritis we all have seen over and over again. Hitherto no explanation of the disease has been offered. We note the presence of a distinct exudative neuro-retinitis in one eye only and the entire absence of a systemic cause. The subjects are usually under twenty-five years of age and in apparently robust health. The disease is "quiet" in that there is usually no involvement of the fifth nerve and the amblyopia is gradual and never complete. The vision falls to $^{20}/_{200}$ or less, and then there is a clearing up of the optic nerve exudate and with it a gradual return of sight. Usually there is no atrophy of the disc resulting, and only a slight lack of definition at its margin or a small bunch of organized lymph along one or two of the vessels coming out of the disc for a short distance beyond its border. In the four cases of this class which I had during the past year the patients had had a short time before a mild attack of "cold in the head on that side," or of grip. Their only symptom was foggy vision. They all recovered perfect sight by the usual treatment. In these cases a balloon swelling of the turbinates, which disappeared of its own accord after the eye recovered, was all that was noted in the nose. The writer does not wish to claim that every one-eyed optic neuritis is of nasal origin; he merely wishes to give the nose the amount of consideration which its intimate relationship with the nerve and perineural structures seems to demand.

We may have three distinct types of optic neuritis from nasal origin:

(*a*) *Acute fulminating retrobulbar neuritis*, due to mechanical compression of the optic and ophthalmic divisions of the fifth nerve from swelling of the lateral walls of the sphenoidal cavity. This form results in profound rapid amaurosis associated with violent cyclonic neuralgic pain.

(*b*) *Acute retrobulbar perineuritis and optic leptomeningitis*, due to infection (?) carried from the nose via the lymph

channels. Here there is no compression neuritis like in the foregoing class, but there is infection and swelling of the subvaginal and perineural lymph spaces. It is manifest that this class is free from pain and that the amaurosis is much less marked, although the ophthalmoscopic picture is much the same as in class "*a*."

(*c*) *Retrobulbar optic neuritis secondary to septic venous thrombosis*, the origin of which is intra-nasal in a vast majority of cases.

In the acute fulminating retrobulbar neuritis the symptoms are profound and unmistakable. The patient first notices twinges of pain in eyeball, brow and temple. Pain soon becomes unbearable in some cases. The eye becomes slightly congested, suffused with tears, rotation painful, pupil slightly dilated and very sluggish. Tension normal, vision very bad, soon becoming entirely or nearly abolished. At first only slight hyperæmia of the optic disc is noticed, soon followed by marginal indistinctness, due to filmy exudate. Veins now become overfilled but not tortuous; optic nerve slightly swollen, generally less than 1 D. The exudate extends a short distance into the retina surrounding the nerve-head. The disease runs a very acute course. The pain soon subsides; the vision begins to return in from three to ten days after the onset; the exudate disappears. Daily tests of the visual field show rapid return of whole segments. The center of the field is slow in returning; in some cases central scotoma remains permanently. The optic nerve now becomes distinctly atrophic, especially on the temporal side of the disc, representing the papillo-macular bundle of fibers; the blood-vessels are not much, if any, reduced, and finally in favorable cases there is complete restoration of sight. The above symptoms are culled from my notes of a case I had nine months ago in which necrosing ethmoiditis and sphenoiditis were positively present. The optic nerve atrophy, which is usually but partial, remains unchanged for the balance of the patient's life.

Deyl (in Norris and Oliver) states: "Acute retrobulbar neuritis is characterized by its sudden and fulminating inception, generally accompanied by severe pain in eye, back of eye, forehead and head; rapid and marked disturbance of vision amounting to blindness in from one to several days and

sometimes in a few hours," but he makes no mention of a possible nasal origin, excepting that it is due to "influenza" in many cases.

Elschnig says: "The lesion is primary interstitial neuritis —catching cold the only assignable cause."

De Lapersonne (*Knapp's Archives*, 1900) declares optic neuritis of this kind to be due to ethmoid and sphenoid disease. He states that the eye symptoms draw our attention to the sinus disease that had been overlooked. He makes use of the following words: "The most frequent ocular symptoms of sphenoiditis is a retrobulbar neuritis *localized in the optic canal.*" He reported three cases of unilateral acute retrobulbar neuritis which led to the discovery of extensive pathological changes in sphenoidal and posterior ethmoidal cells.

Berger says: "Optic neuritis may develop from acute infective disease in the nasal accessory sinuses."

Hansell, of Philadelphia (*Med. and Surg. Rep.*, 1896), reports a case of blindness from ethmoidal and sphenoidal disease. The nasal disease was distinctly present and the diagnosis seemed perfectly clear.

Hajek, in his classical work on the nose, states: "If the bony framework of the sphenoidal cell is involved from sinusitis, serious complications result, rapid blindness—monocular, has been observed many times. The cause is either pressure against the optic nerve at its orbital entrance, or perineuritis, each meaning that the bony wall has been eroded."

Dr. C. R. Holmes, of this city, reported in *Knapp's Archives of Ophthalmology*, 1896, a clear case of acute retrobulbar neuritis, due to sphenoiditis, presenting all the classical symptoms and recovering after a considerable quantity of pus had been liberated from the sinus. He illustrated his complete report by anatomical drawings from sections he had made. I had the pleasure and opportunity of working with him throughout that case, which I believe was the first of its kind published, demonstrated and explained. But if you will scan the literature from the time Helmholtz gave us the ophthalmoscope down to the present, you will find reported dozens and dozens of cases of acute blindness in one eye associated with the ocular symptoms mentioned, and in a very few you will find mention made of the nose. This statement stands

true up to the present day. The object of my essay is to call attention to the fact that the nose is usually not thought of in this disease. The unfortunate circumstance in the make-up of this naso-ocular disease is the fact that rhinoscopy usually fails to reveal more than a slight and apparently simple acute boggy swelling of the turbinates. The ocular symptoms entirely overshadow the nasal.

In the diagnosis of acute retrobulbar neuritis we would have to exclude all other diseases and conditions, such as glaucoma, orbital neoplasms, cerebral syphilis, brain tumors and abscesses, poisoning from lead, quinine, tobacco, stramonium, iodoform and the other toxic substances, diabetes, albuminuria, malaria, anæmia, chlorosis, specific neuroretinitis, embolism of the central artery, and hysterical amblyopia. In the presence of any of these in a given case the diagnosis of optic neuritis from endorhinitis would hardly stand.

The striking features of acute fulminating retrobulbar neuritis from nasal origin are:

(*a*) The rapid onset, course, duration and termination as compared with other forms of optic neuritis.

(*b*) The presence of excruciating pain, involving most all of the branches of the first division of the fifth nerve.

(*c*) The complete loss of vision in a short space of time after the onset (from a few hours to a few days), and the rapid return of fair vision in most of the cases with, however, more or less optic nerve atrophy and frequently with absolute or relative central scotoma.

(*d*) The absence in many cases of positive evidence within the nose that the trouble is of nasal origin.

The treatment will suggest itself. Inasmuch as blood-letting is indicated anyway, I would not hesitate to remove all or a part of the middle turbinated bone and at least try to get into the sphenoidal cavity, but would be heedful of the dangers. I think the middle and superior straits of the nose are the ideal places from which to draw blood in this class of cases, because the opening of blood-vessels supplying the nasal attic would have a direct influence on lessening the orbital congestion.

The nasal operation affords a two-fold purpose—blood-letting and drainage.

DISCUSSION.

DR. J. O. STILLSON, Indianapolis.—I think this is a very important paper, and it is certainly worthy of our serious consideration, because it opens up the question of the relation of the two sides of the fundus, as between the diseases of the eye and the diseases of the nose. We all know that we owe a certain amount of regard to each other in our different fields of labor; the eye class is usually attended by men who limit their studies to certain fields of observation where they are capable of doing the most good. Of course, an oculist is busy with his line of work and would be more liable to deficiencies in regard to the nose and other parts of the body. We can not cover the whole field. We can not spend our whole time on the anatomy of the entire human body, and the public do not expect it of us. Consultations never hurt and they often help. I think the benefit of counsel is the patient's due, and I think those who refuse to call counsel lose more than they make. If a man is going to limit his work and observation, and says he needs nothing but his own little bailiwick, he will find himself a small doctor. You take adenoids in relation to phlyctenulæ, inflammations of the lacrymal duct—and I might go on and enumerate a number of diseases where the eye symptom is simply a result. In other words, it is a secondary disease, and the primary exciting cause is the nose. Here is a case in point: We all remember that we used to hear of cases of optic neuritis *ex causa incognita*—a learned name for ignorance. I remember having seen certain cases of optic neuritis on one side, and these were cases of *ex causa incognita*. About four years ago this was brought to my mind by a case I had similar to that mentioned by the Doctor, where a young lady was suffering from an optic neuritis, as plain as it could be seen with the ophthalmoscope, and no known responsible cause whatever. We bothered along with that case for months, and finally had to take up the nose, and not until the operations in the nose were instituted was there any relief. I had a case at my office yesterday of optic neuritis with intra-nasal disease, where the lady had been under the care of a gentleman in Indianapolis of fairly good attainments, who had paid no attention to the nose until he told the lady she would lose the sight of the eye, and he would begin treatment of the

nose. You say: Why don't you send your cases to a rhinologist? It is not everybody who is going to have two specialists on the same case, and you ought to know something more than the retina. You ought to know the orbit; you ought to know the sinuses, the nose, and you ought to be able to furnish the remedy. And thanks are due to the oculist for bringing this fact before the profession, which was so ably done a few years ago by Dr. Holmes, and to his article we owe a great deal of thanks in putting us on the right track. His admirable article was a revelation to me; it was so graphic and so plain and so beautiful that it struck me like a flood of light. I think there is a middle ground. I do not think we should take upon ourselves that we are the only ones in it, but that we should recognize each other; and, therefore, I heartily endorse a society of this kind where the two kindred specialties are brought side by side and where we can study our cases together. I have come to believe that a man can be a very poor oculist indeed if he knows nothing about the nose. For years I refused to take these nose cases, because I thought I had enough to do and there were plenty of others to do these things; but the force of practice drove me into the necessity of looking into the nose, and since I have been observing these cases in the vault of the nose I have had success that I did not have before. I commend the paper and think it deserves our consideration.

Dr. A. Alt, St. Louis.—I would like to ask Dr. Holmes whether such nasal trouble always causes a one-sided optic neuritis, or whether obscure cases of one-sided optic nerve atrophy may also be due to this same cause. I do not remember that I have seen any cases like the ones reported. The close relation between the nose and the optic nerve was, however, brought home to me by the case of a man who had had an operation performed on the turbinate, and in a few hours afterward was perfectly blind on that side. Of course, we all know that cases of one-sided blindness may occur from a great many causes, and perhaps we must blame nose affections for these cases more than I, at least, thought. I have under my care now a young man who, on account of a one-sided dimness, went to an oculist and was given glasses, but instead of getting relief, went blind in a few days in one eye. He had

his nose examined at my recommendation, but nothing abnormal was found. It was one of the cases for which we have no explanation; I think it must have been a vascular disease. I have given him iodide of potassium, and the vision is now about $^{7}/_{200}$ in a small field.

Dr. Oscar Dodd, Chicago.—I had a case of sphenoidal suppuration about a year ago, which, like the last case mentioned by Dr. Holmes, came to an autopsy, and found that there had been necrosis of the bone, breaking through, so that he died from meningitis; still, no symptoms of eye trouble presented until the meningitis developed. I examined him very carefully for eye trouble, as I suspected that sphenoidal suppuration was the cause, although he came to me with a mastoiditis, for which I operated. Later, serious symptoms developed from the sphenoidal trouble. I was surprised on looking up the literature on the subject to find so many men, in describing these cases, do not mention the eye symptoms, while others give them as the prominent ones. Schaefer, of Bremen, in reporting about seventy-five cases, says he has never seen eye trouble in any of the cases, although Knapp, of New York, and Hardy, of Chicago, report cases where the eye symptoms were the first noticed. It is rather surprising that the optic nerve should not have been affected in a case where it was separated from the pus cavity, as it was in this case, by a thin wall, and was surrounded with purulent exudate at the time of the autopsy.

Dr. C. R. Holmes, Cincinnati.—I am and have been for several years very much interested in this subject, and have devoted considerable time to the study of the accessory cavities. My case, kindly referred to by the speaker, was a typical one, and caused me to look at this subject from a different standpoint. I beg to refer to it just for a moment. It was at that time the first case of its kind I have been able to find on record, where the diagnosis was made in time to restore vision.

The patient had suffered for several months, receiving treatment for malaria and other affections. Pain would compel him to sit, holding his temple and occiput on the affected side for hours, and I have observed that one of the symptoms of disease in the sphenoid is pain in the temple on the same side,

and can be produced by putting a hook into the cavity and touching the side of the sphenoid cavity. I believe this to be an important symptom. I relieved this man after there was total loss of perception of light. Drs. Zenner and Ransohoff saw the case in consultation, but neither would give a positive diagnosis. Patient could not see a bright electric light before the affected eye. The vessels were reduced in calibre, and disc very pale. I removed the middle turbinated, opened the sphenoid freely, which was followed by the evacuation of pus from the cavity, and in a few days he began to improve and sight was restored, excepting for a faint central scotoma, due to the fact that the papulo-macular fibers were compressed too long. Had I known then what I know now, and operated early, I am positive even this would not have occurred. I had occasion to examine him recently, and found the sphenoid cavity perfectly healthy.

Another case belonging to the subject under discussion, I saw with the late Dr. Thorner, who had removed a polypus from the region of the middle turbinated body. Two days after, the patient developed a violent optic neuritis, followed by complete atrophy of the affected eye. We must not go to the extreme, however, and expect to find eye complications with every case of sphenoid trouble, because there is a very large percentage who have had these troubles for ten, twenty and more years, and the eyes have never been involved. Others, again, only have asthenopic symptoms.

One of the most typical of this class I ever saw, and where the patient died from hæmorrhage, never had any optic neuritis. He came for glasses. His vision was perfect with the proper correcting lenses, but there was marked failure of accommodation. I obtained a post-mortem, at which Dr. Vail assisted. The necrosis was so extensive that the entire roof of the sphenoid cavity had been destroyed, and one could pass the finger into the sphenoid from above, while the anterior wall of the cavity was intact.

Dr. Vail, closing the discussion.—I have nothing to add to what has already been brought out in the paper, except to thank the members who have kindly discussed the paper, and to urge that we search diligently for sinusitis and at least strongly suspect it in cases of monocular optic neuritis.

BLENNORRHŒA NEONATORUM.

By ADOLF ALT, M.D.

WHAT an enormous amount of good has been accomplished by the method of *prophylaxis* against the disease called blennorrhœa neonatorum, which was introduced by Credé in 1881, you all know and need not be reminded of. He is, in my opinion, one of the great benefactors of mankind.

It is a great pity that here, out in the West, his method is certainly not practiced, nor, for that matter, any method of prophylaxis, as frequently and as thoroughly as it should be. Still, its influence is felt in the fact that cases of blennorrhœa neonatorum have of late grown decidedly less frequent. Yet not all that can be done in this direction is being done. A number of the States of our Union have enacted laws—and some quite stringent ones—concerning blennorrhœa neonatorum, with the hope of thereby exerting a beneficial influence. But thus far they seem to have accomplished but little, and they are probably as inert as many another good law, because nobody carries it out. It is not likely, in my opinion, that such laws will avail much in connection with the disease under consideration until both physician and public are educated up to them, until they know the causes of the disease, the possibility and almost certainty of its prevention by the proper methods of prophylaxis, and, finally, how to deal with the cases when these measures have been neglectfully omitted, and I may add to this, until both physician and public are thoroughly imbued with the fact that an eye lost by blennorrhœa neonatorum is a damning reflection on one or both of them.

In the following I do not intend to carry coals to Newcastle and to deliver before this assembly a lecture on blennorrhœa of the newly born. I only want to draw your attention to some of the facts concerning this disease, which have been elucidated in the last quarter of the past century, and which, it seems to me, are of very great practical value.

It is not new to you that the term "blennorrhœa neonatorum," like many names in our medical terminology, includes more than one form of disease; in fact is applied without any distinction to certain diseases of the conjunctiva appearing in

the newly born and which, as we at present understand it, may be due to widely different causes. The name simply applies to a symptom—the running of a purulent discharge—which, though a very prominent and characteristic feature in these affections, gives no clue whatever as to the real origin in the individual case. Twenty-five years ago no doubt entered the mind of most oculists with regard to the origin of this affection. Gonorrhœa, and gonorrhœa alone, of one or both parents, was considered to be infallibly its cause.

We now know better, and we may well feel ashamed at many a mental wrong we did in our ignorance.

This improved knowledge is due to systematic bacteriological examinations. Such have been made in cases of blennorrhœa neonatorum and reported by a number of observers, like Haab, Kroner, Axenfeld, Schmidt–Rimpler, and others.

At the meeting of this Association, held at St. Louis, in 1897, Dr. F. T. Reyling reported a series of bacteriological examinations made by him in fourteen cases of blennorrhœa neonatorum. He found the gonococcus of Neisser in only nine of these cases; in four it was absent. For years I have made bacteriological examinations of the pus in every case of blenorrhœa neonatorum which I saw in my private practice. I have records of seventeen cases. In nine of these I found the gonococcus of Neisser, in four cases the diplococcus lanceolatus of Fraenkel, in one case a short bacillus which was probably the bacterium coli, in the remaining three cases only some staphylococcus.

Most recently (in *Graefe's Archives*, Vol. LII., Part I.) Groenouw, of Breslau, reports a series of one hundred cases of blennorrhœa neonatorum which he examined bacteriologically, having previously in another paper reported forty of the cases. This is probably the largest number any one man has had occasion to so examine. He found the gonococcus of Neisser in forty-one cases only; in five cases the diplococcus lanceolatus of Fraenkel; the streptococcus pyogenes in two cases; the staphylococcus pyogenes aureus in four cases; the micrococcus luteus in one case, and the bacterium coli in seven cases. In about one-third of Groenouw's cases no specially typical pyogenic bacteria were found.

By adding Reyling's and my small series to Groenouw's, we

find that in only sixty-one cases out of one hundred and thirty-one of blennorrhœa neonatorum, the gonococcus of Neisser was found, which is in less than half of the total number.

In all of these cases the differential diagnosis had been made by means of Gram's method, which, as you know, decolorizes the true gonococcus.

The results of these examinations show what we should never forget—that it is our duty to always examine the discharge from the conjunctival sac, not only in blennorrhœa neonatorum, but in all conjunctival and corneal affections, at least if we want to be scientific physicians and want to adapt our therapeutic measures to the individual case, as we always should.

From these considerations we can no longer consider it scientific treatment if we—as most text-books will still have it—simply apply a one or two per cent. solution of nitrate of silver in every case in which there is a purulent discharge from the conjunctiva.

We now know that the severe cases of blennorrhœa neonatorum—those that cause very violent symptoms, endanger the cornea and do not yield very rapidly to treatment—are usually due to the gonococcus of Neisser. The lighter forms, which yield more readily to treatment, are usually due to some other microbe. Although there are exceptions to this, as a general rule I think it holds good.

Let us see now in what way these considerations will, and necessarily must, influence our measures, both of prophylaxis and treatment.

While the now classical prophylactic application of a drop of a two per cent. solution of nitrate of silver to the conjunctiva of the newly born, as introduced by Credé, has done an immense amount of good, is it always necessary, or perhaps at all necessary, to use so strong a solution? I suppose all of you have—I certainly have—seen cases in which a few days after the application of the Credé method an infant had a decidedly purulent discharge from the conjunctival sac. There was perhaps little œdema of the lids and the discharge was not very profuse, yet the picture presented was that of a milder type of blennorrhœa neonatorum. If in such a case

no bacteriological examination is made and the treatment with nitrate of silver kept up, a blennorrhœa due only to the chemical and traumatic influence of this salt will simply be perpetuated. I have in some such cases found no pyogenic microbes at all, and especially no gonococcus, and they got well rapidly on discontinuing the nitrate of silver treatment and substituting for it a mild antiseptic eye-wash, besides cold applications.

I have no doubt that such cases have been observed whereever Credé's method is regularly applied. They are not very frequent and no particular harm is produced, yet they seem to speak against the promiscuous use of the classical two per cent. solution of nitrate of silver—not, as I want to be distinctly understood, against the method of prophylaxis. The question only remains, whether we must insist on the application of so strong a solution.

In a paper published by Dr. Lucien Howe in the March (1898) number of the AMERICAN JOURNAL OF OPHTHALMOLOGY, in which he advocates the enforcement by law of Credé's method in public institutions, this author says: "It is true that a remedy *better* than silver nitrate may be discovered at any time, but if this happened the law could easily be changed." This evidently shows a certain degree of dissatisfaction with the routine application of Credé's method, although among 24,000 cases of the application of this method, collected by him, disagreeable results seem to have followed in only four doubtful ones.

If I understand the theory of the action of a one or two per cent. solution of nitrate of silver in the treatment of gonococcic conjunctivitis right, it destroys by its caustic action the older and superficial epithelial cells and thus brings the younger cells in which the gonococcus is usually lodged to the surface and thereby more directly under its bactericidal influence. At least we were so taught in former years, and hence the rule to apply this remedy but once in twenty-four hours; that is, when the eschar it had caused should have been cast off. If this is true, why should not solutions of remedies, which will not coagulate the albumen of the superficial layers of the epithelium, and which therefore can penetrate at once into the deeper layers and directly reach the

gonococcus, prove of more immediate and, therefore, of greater value?

In an article on gonorrhœal affections of the eye (*Berlin Klin. Wochenschr.*, February 11th, 1901) Greeff mentions that in 1887 already Behring stated that in three cases of recent gonorrhœa he had succeeded in destroying the gonococcus by only three injections of a solution of nitrate of silver of only 1 in 7500 (about 1 grain to 16 ounces). Bacteriologists tell us that nitrate of silver in the proportion of 1 to 4000 kills the gonococcus. Greeff further states that a one-fourth per cent. solution of nitrate of silver is probably sufficient for all prophylactic purposes. He also argues that the stronger solutions cause a superficial coagulation, which is an obstacle to the deeper penetration of the germicide.

Yet, when applied right after birth as a prophylactic measure, there is probably never any need of a deeper penetration, since the gonococcus has as yet hardly had time to pierce the superficial layers.

The old and almost generally accepted method, as you know, was to treat any and every case of blennorrhœa neonatorum, regardless of its real origin, with the daily application of a from two to five per cent. solution of nitrate of silver. I may state that I have never used it any stronger than in a one per cent. solution, because I have always had a suspicion that the stronger solutions helped in the production of corneal ulcers.

To be sure, we know now that the gonococcus can, when it is undisturbed, and the discharge is allowed to remain stagnant in the conjunctival sac, by its own action gain an entrance into the superficial epithelial cells and thus cause an ulceration. Yet how much easier is this when a superficial wound, so to speak, throws the doors wide open for its entrance? This may be brought about by the macerating action of stagnating pus on the superficial epithelial cells, or by superficial and even microscopical scratches on the corneal surface produced by the physician or attendant during the manipulations for cleaning the conjunctival sac or for treating the conjunctiva. It may equally well follow the application of strong solutions of nitrate of silver which, when they reach the corneal epithelium, in spite of our trying to guard

against it, will coagulate the superficial cells and cause their necrosis. From this reasoning I have never used a stronger solution of nitrate of silver in these cases than a one per cent. one, and the cases in which a corneal ulcer was formed while they were under my treatment have been extremely few.

It is a common experience that the cases of blennorrhœa neonatorum differ very greatly as to their degree of virulence as well as to the time it takes to cure them. I have seen cases which took six weeks and even more of careful and watchful treatment with nitrate of silver to get well, and again I have seen cases cured in comparatively few days, say a week, with a mild antiseptic eye-wash, as for instance bichloride of mercury 1 in 10000. This difference in behavior, which we could formerly attribute only to a different degree of virulence of the gonococcus in the particular case, is now by means of our bacteriological knowledge explained in a more natural manner and better understood. As a rule the virulent cases, which yield only more or less promptly, but probably best to treatment with a silver salt, are of gonococcus origin. On the other hand, in those cases which are of a mild type and generally yield easily and speedily to a mild antiseptic treatment of some kind and cold applications, we do not find the gonococcus but some other pyogenic microbe or no known one at all. The cases of a medium type are often due to the diplococcus lanceolatus or the bacterium coli (Groenouw).

This knowledge must necessarily influence our therapeutic measures. At least I have of late adhered to some such principle in my practice. Greeff (*loco citato*) seems still to adhere to one and the same method in all cases when he states that in his clinic at the Charité at Berlin the cases of blennorrhœa neonatorum are successfully treated by a one-tenth per cent. solution of nitrate of silver. Since I have made bacteriological examinations of the pus in blennorrhœa neonatorum I have in my treatment been governed by their results. While I have still in some cases, in which I found the gonococcus, relied on a one per cent. solution of nitrate of silver, I have of late replaced this altogether by a one, two or three per cent. solution of protargol, a remedy which I decidedly prefer, contrary reports by others notwithstanding. As we know by experiment, this preparation of silver penetrates deeper into the

tissues than nitrate of silver, because it does not, like it, act as an escharotic. It is also but very little irritating and causes almost no pain—two points which I, however, grant are of little importance in the treatment of the conjunctiva of infants. However, instead of making only one application in twenty-four hours, as with nitrate of silver, I order the protargol solution to be instilled into the eye, after the removal of all pus by manipulation by the attendant, from four to eight times in twenty-four hours, besides one application of it by myself. This treatment I can conscientiously recommend, as I have seen even several gonococcus infections get well with it in the course of two weeks. Cases in which I can find no gonococcus do usually well with frequent instillations of a 1 in 10000 bichloride solution, or even a four per cent. boracic acid solution with cold compresses. When they do not quickly respond to this treatment I use a one per cent. protargol solution instead.

One of the greatest benefits of our modern improved and continually improving knowledge is that it teaches us, as physicians, better and better to individualize the cases entrusted to us and to institute our treatment accordingly. As this method of acting is the only scientific one, it is our bounden duty in all cases to adopt it, and not to continue in the old methods which come from our fathers, who, with all their great achievements, did not have the advantages of knowledge which we have, and let us hope will continue to have, in an ever-increasing quantity for the benefit of mankind.

DISCUSSION.

Dr. Dudley S. Reynolds, Louisville, Ky.—I think Dr. Alt has modified very much those methods used in the beginning of his professional career, but I want to protest earnestly against the prevalence of meddlesome interference with the eyes of the new-born.

It has been my experience in the Louisville City Hospital, and I take it, it is the experience of others with the Credé method, that almost every one of the children have infected eyes before they are ten days old. When no meddlesome interference is practiced, the disease is rare. Careful cleansing of the new-born, when done by an intelligent nurse, whose

hands have nothing to do with the lying-in woman and no other duties to perform, affords the best protection to the eyes of the new-born. When the eyes are infected, the patient must be put in a different ward. In that way we have been able to stamp out the disease. Until these methods were practiced in the hospital we had frequent infection. There is no sense in medicating the sound, uninfected eyes of a new-born infant. I could not find language strong enough to pronounce my opinion of the meddlesome interference with the eyes of the new-born.

As to the nitrate of silver, I would like to say that it is impossible to treat all cases in exactly the same way; but where abrasion of the conjunctiva is distinct, where bloody discharge occurs, you may readily judge the disease is very probably gonorrhœal. Such cases have been called malignant when the cornea has been destroyed by the strong nitrate of silver applications. If an application can be made which will sterilize the fluids and wash the surface without irritating the eye, then it is reasonable to believe early recovery will follow; and, it may be safe to say that no lesions of the cornea will occur. In every instance where the bichloride solution is used, it should be associated with chloride of sodium, because the normal conjunctiva has always upon its surface a solution of this salt. If it be deprived of it, irritation follows. If you use a solution of chloride of sodium, five to ten grains to the ounce, and use it by irrigation every ten, fifteen or twenty minutes, according to the urgency, as indicated by the pus formed, it will cure the worst case of gonorrhœal infection. Corneal abrasions need never occur if irrigation is practiced sufficiently early. Irrigate every ten, fifteen or twenty minutes; the interval should never be greater than twenty minutes for the first four or five days of the disease. In the application of solutions of the bichloride of mercury, one-eighth of a grain of crystalized carbolic acid should be added to the ounce of solution to render the irrigation painless. The local anæsthetic properties of the carbolic acid add greatly to the efficiency of the treatment. Then, if we have in the chloride of sodium, and bichloride of mercury for bad cases, and borate with chloride of sodium for the mild cases, a means of treatment by which the cases get well in ten days, why should we be burning the eyes with nitrate of silver or protargol?

I am much pleased to hear Dr. Alt say that one part of nitrate of silver to 4,000 parts of water is sufficient to destroy the gonococcus; and that this solution of nitrate of silver has in some hands been found more potent than the one or two per cent. solution. I believe that the weaker the solution, the better the result. I always keep in mind the statement of Sydenham, who said in his essay on the treatment of gonorrhœa, "He who cleanses well, cures well." The great point is to keep the pus away from the conjunctival surface, and not add to the injury already present.

Dr. J. O. Stillson, Indianapolis.—I never allow the Credé method to be used at Indianapolis without my consent. For many years I felt I was rather an old fogy about it, but I never could bring my mind to the point where I could see the necessity of tampering with an eye not already affected, and it seemed barbarous to me to put one per cent. of nitrate of silver into a normal eye. If I understand Credé's method, it is ten grains to the ounce, or stronger yet. I could not do that. Dr. Alt's paper meets my ideas with that exception, so far as the differential diagnosis is concerned, and I am glad he uses that old term "blennorrhœa." We know that he means a discharge, and it is not necessarily limited to the gonococcus, but is due to the different microbes, and the differential diagnosis can be made the first day. The time to begin your war is when war has been declared. Of course, when you talk about prophylaxis, that is a different thing. I would be the last to decry it, but that can be done with something else than Credé's method, and Dr. Reynolds has defined my position when he says we should take up aseptic methods instead of antiseptic ones. In Indianapolis we have not had to adopt it. We simply cleanse the eyes and use asepsis, and we have had good results.

Dr. F. A. Phillips, Chicago.—Dr. Reynolds has stated, "He who cleanses well, cures well." We have, however, one remedy, which in the cleansing process has been universally valuable, and that is permanganate of potash, and in the use of that remedy, where, as in my clinic at the Illinois Eye and and Ear Infirmary, many of the patients will not come into the hospital, I invariably give this solution with instructions to use it every three or four hours, alternating with boric acid

solution, which should be used every fifteen to thirty minutes in severe cases. This is a very effective treatment. The permanganate is used in a strength of 1 to 3,000 or 6,000 solution, depending upon the severity of the case, the amount of infection, and the swelling. In the clinic I am in the habit of using a strong solution of protargol, and not the strong solution of nitrate of silver. I believe the weaker solutions are less effective.

Dr. Brown, Chicago.—It seems to me that in institutions we can safely accomplish many things that we cannot so safely accomplish in individual practice. I think we can run a great risk in simply making a routine of the care of these cases, and using this or that particular solution or remedy to the exclusion of others. Nurses and general practitioners without the necessary manipulative skill may, in attempting to carry out the measures we consider ideal, lacerate the corneal epithelium, thus opening up a pathway for infection. Very few of us believe that we directly kill the micro-organisms by the use of antiseptic solutions in this disease. Our aim is to render the conjunctival sac as near sterile as possible, and to maintain surroundings unfavorable to their further development. In this the frequency of cleansing is a most important factor, and if in this cleansing it be brought to mind that injury to the corneal epithelium must be avoided, we note an important element in the successful handling of the disease.

Dr. O. Dodd, Chicago.—There is one thing which I find to be of great benefit in keeping the eye clean, and which does away with the necessity of frequent cleansing. I think every ten, fifteen or twenty minutes is too frequent, as the children can not stand it. I have seen them so excited over the frequent disturbance that it would have been very serious if continued. The thing I speak of is the use of vaseline in the eyes after each cleansing. It has worked very well in the cases where I have used it. I have found in these cases there is much less danger of corneal infection. It protects the cornea, allows the secretion to get out by preventing the sticking together of the lids, and makes the frequent cleansing unnecessary.

Dr. W. L. Dayton, Lincoln, Neb.—A few words in regard to the keeping qualities of the protargol solutions. Of course,

the same care must be bestowed on the preservation of the solution as on the nitrate of silver solutions, but it appears to me the one, five, or ten per cent. solutions deteriorate with age. I have noticed it, and frequently spoke of it, that it is more irritating when frequently prepared, even in the weaker solutions, than is the stronger later on. Whether there is a precipitate or not, later it gets darker, which shows there is a deterioration. I have sometimes used a five per cent. solution of the older at the hospital and found there was less smarting than with the newer preparations of the same strength. I thought at first there was but little irritation from the protargol solution; in many cases there is considerable; it is only for a moment, and is nothing like as lasting as the weakest of the nitrate of silver solutions. There is a close distinction between asepsis and antisepsis. In the treatment of the eyes of the new-born, cleanliness is the great factor, and even then we use the simple normal salt solution. When it is used five to ten grains to the ounce, it is a little above the normal salt solution; therefore I use two and a half grains to the ounce. But so far as the frequent cleansing the eyes of the new-born, I believe it is essential to keep them clean of secretion, and I advise the nurse to do this thoroughly as often as may be necessary. The country doctor does not have the advantage of the city doctor and can not depend upon trained nurses, but has the neighbors, or possibly some old lady who is the nurse in the neighborhood at time of confinement; these people are very careless with the baby's eyes. I find this disease is much less frequent than it used to be—whether it is because of the teaching of our colleges that cleanliness is important, or that the old women are less frequent and supplanted by trained nurses. But whether we use an aseptic or antiseptic, it is the main feature to use it so that it will not irritate the cornea. Permanganate of potash is undoubtedly good. Of course, in the strength of 1 in 3,000 it has certain staining qualities which are bad, and its value is not greater than the borate solution or the normal salt solution.

Dr. C. W. Dodd, Cincinnati.—A question in our private practice arises as to just how this cleansing shall be done to avoid injury. We are apt to say, "This must be cleaned so often." But how is that cleansing to be done? If you simply

say, wipe the pus out with cotton, you run the risk of scratching with the fingernail. Or, if you suggest wrapping cotton on a wooden tooth-pick, the nurse or mother is liable to leave the end of the pick projecting, endangering thereby the cornea or conjunctiva. I try to furnish the person who is to carry out my instructions with a simple glass rod, such as I have used for the past thirteen years. The idea was given me by Prof. Leber, now of Heidelberg. The glass rods are solid, one-eighth of an inch in diameter, and about four or five inches in length, and they should taper somewhat at each end; both ends should be a trifle flattened or spatula-like. No other form of cotton carrier can be so clean, remain aseptic, and be so incapable of harming the eyes; cotton is easily wrapped on to the rods and as easily removed. By means of the rod, cotton can readily and carefully be passed under an upper lid, which is difficult to evert, and with no injury to the epithelium of cornea or lid. Vaseline ointment, either simple or medicated, I also use in these cases; and for introducing any kind of ointment into the eye no other means is so safe and cleanly as these same glass rods. In the thirteen years I have been using these rods daily, I have never had the slightest injury result therefrom.

Dr. D. T. Vail, Cincinnati.—I wish to add my experience. The remarks so far have left unchallenged the plea made by the essayist for the milder applications in this dread disease of the eye instead of the old-fashioned strong nitrate of silver solution.

In the Cincinnati hospital I had some sad cases of blennorrhœa neonatorum, in which the diagnosis was made with the microscope and the gonococcus found present; and I being anxious to spare these little beings the sufferings which I had been led to believe they must undergo, when powerful astringent solutions were used, tried the newer methods, as recommended by the essayist. I used the protargol thoroughly in the weaker solutions, and also the Scott's solution, and am sorry to say that my experience was very sad. The eyes were lost; they ran out, and I believe if I had it to do over again I could have saved them by the old regulation nitrate of silver treatment. I have gone back to the nitrate of silver solution. I turn the eyelid over and keep on turning it to expose the

rugæ of the cul-de-sac, and then by means of a soft camel's hair brush I apply the two per cent. nitrate of silver solution thoroughly, being careful to avoid the cornea. I then gently mop the excess of the solution by means of wet cotton, well squeezed, apply a little plain vaseline, and use ice applications. I am free to confess that in an experience of twelve years I have yet to see the first case lost when so treated, except where the cornea was already ulcerated before this treatment was instituted.

Dr. C. R. Holmes, Cincinnati.—In regard to the use of protargol, I have tried it in normal eyes in solutions from three to twenty per cent. to ascertain the strength that could be borne without suffering, if the preparation is properly prepared. Dr. Emil Gruening told me several months ago he was using twenty per cent. solutions in private practice, and he was enthusiastic over the result. Recently he referred to the subject in the same terms. I would ask what experience others have had with the retractor irrigator under the lid. I do not see why a glass rod should be used. Soft pledgets of cotton are all we need. The vaseline I have also used for a long time, and I consider irrigation every ten minutes too frequent, as it exhausts the child. I never irrigate oftener than every half hour or hour.

Dr. Dudley S. Reynolds, Louisville.—I abhor the idea of touching the eye with any instrument. My method is to take the glass out of a common eye dropper and place it in the end of the rubber tubing connected with a rubber bag of not less than a quart capacity. The bag should hang twelve inches above the plane on which the patient's head rests. This gives a small stream which will play over the surface of the lid, holding the upper lid up and the lower lid down with the finger and thumb. Then by holding the nozzle over the bridge of the nose, never permitting it nearer to the eye than one inch, the danger of wounding the cornea is entirely removed. A small bit of cotton-wool should be held on the temple to catch the flow. Do not touch the eyeball, but hold the lids with the fingers, and let the fluid play on the everted lids, never on the cornea. As to vaseline, it is unreliable, as we never know what it may contain. We should always order

petrolatum, which is recognized by our Pharmacopœa. This may be relied upon as a safe and mild antiseptic.

Dr. Alt, St. Louis, in closing the discussion said: We are all of the same opinion—that we would not put any medicine into the eyes unless there is a suspicion of infection. Indeed, I spoke of cases where I was satisfied that very thing had produced the discharge. With regard to cleansing of the eyes by the nurse, I am greatly in favor of their doing it without coming in contact with the eye. By using a large amount of warm borate solution with the eye dropper and simply manipulating the lids gently, they will be able to wash out nearly all of the pus without touching the eye itself. With regard to the decomposition of the solution Dr. Dayton spoke of, I am satisfied that it deteriorates when it gets old. However, I use it all the time, and my solutions have not time to get old. I have not used nitrate of silver for three years in any case whatever. I have used protargol in every case. This I could not have done if I had not found it to be what I claim for it. I would not give the nurse a glass rod; it is too dangerous. With regard to the camel's hair brushes Dr. Vail speaks of, I never use them any more. I examined some of my brushes under the microscope and I am satisfied that some of the little hair spikes come off, and I use no more brushes. I use cotton wound around the little instrument the dentist uses to drill in the nerve canal. When I buy this, it is sharp at the end which I wrap the cotton, and this I file off. With regard to the loss of eyes Dr. Vail speaks of, I never have had such an experience. I have been perhaps extraordinarily fortunate, but I do not remember any eyes lost from blennorrhœa neonatorum, not only in my practice, but also that of others, which had come to the specialist at a time when there was not yet any alteration of the cornea.

THE VALUE OF METHYL BLUE AS A LOCAL APPLICATION.

By M. F. COOMES, A.M., M.D.,

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LOUISVILLE, KY.

IN presenting this subject to your society, I will endeavor to present the clinical side of it exclusively. The methyl blue, as you all know, is a coal tar compound used extensively in dyeing and in the arts, and staining bacteriological specimens. It is a diaphenylamine compound; it is known as such to the laboratory chemist.

First of all, it is a germ destroyer, and this property is most likely due to its great penetrating powers. Possibly it chokes the germs to death. My first experience with it was about the time it made its appearance on the market, some fifteen years since. The first case in which I used it with marked benefit was in a case of lupus of the nose. This case occurred in the person of an old woman, and was apparently a hopeless one. I ordered a solution of the drug in the strength of five grains to the ounce of water, to be applied after thorough cleansing night and morning. The sore healed rapidly and has remained closed from that day to this. This patient had gone the rounds of the profession, and had been treated with almost all of the drugs that are used for the cure of open sores.

I have treated suppurating otitis media with it for years, and with most satisfactory results. After the suppurating surface has been rendered as nearly clean as possible, a solution of five grains to the ounce of water is dropped into the ear and permitted to remain by packing the external canal with cotton. In many cases where the discharge is slight, a single application will dry the ear for weeks and even months. Its curative powers in these cases seems to be due to its powers for penetrating and staining open tissues. It finds its way into recesses that the cleansing solutions and other agents can not reach. In suppurating conditions of the lacrymal sac there is no application that equals it in arresting the discharge.

When the sac has been properly drained, a few washings with the blue will suffice to destroy the pus.

In diseases of the antrum of Highmore, where there is pus, it will be found equally valuable. In some of those cases, with the most thorough drainage there may be a pocket that contains pus, and the blue will be one of our most valuable agents in making the cure complete. In all of these cases the blue will be one of the most valuable agents at our command.

In carbuncle it is equally valuable, and in fact its value in the treatment of an abscess anywhere cannot well be over-estimated. Time and again I have seen large carbuncles about the neck cured in from eight to ten days by the following treatment: A crucial incision under local anæsthesia; the cavity or cavities evacuated and swabbed out with liquid carbolic acid, and then mopped out with methyl blue and packed lightly with gauze saturated with the blue. If there are many cavities, as there is in some cases, they should be thoroughly cleansed after the first dressing has been removed, and redressed with the blue each day until recovery is complete.

In purulent conjunctivitis—ophthalmia neonatorum—it ranks with any local agent at our command. I have relied on it for years, and in all of that time have lost the eyes of but one child. In this disease the same rules as to cleanliness must be pursued, and the blue applied two or three times a day, according to the emergencies of the case. It does not check the suppuration so suddenly as silver, and in fact its action is entirely different. It will not stain the cornea permanently. Its use should be persisted in to secure the best results.

As a means of diagnosing the presence of corneal ulcers, it has no equal. Its affinity for open tissues is so great that it takes hold of them and makes such a clear outline that it not only defines the outline of the ulcer, but furnishes a guide for the application of the actual cautery or any one of the caustics that is necessary to apply. Its value in these cases is especially valuable to practitioners and surgeons who are not experts in detecting these ulcers; in fact, in any case where there is doubt as to the absence or presence of an ulcer of the cornea, this stain will settle it promptly.

It not only stains them, but it is one of the very best local

applications that can be made to ulcers of the cornea where the use of a strong caustic is not demanded—either before or after the caustic application. Its germicidal properties are here fully demonstrated.

In cases of follicular tonsillitis, it is almost a specific. In the clinic at the Kentucky School of Medicine, where every opportunity to demonstrate its efficacy is afforded, there have been hundreds of cases treated in the last ten years. It is a rare thing to have them make a third visit, the great majority of them not making more than one visit.

Cancer.—In epithelioma, I have witnessed some remarkable results from the local use of methyl blue. One most remarkable case, that of a Mr. White, at Big Clifty, Kentucky. This man had lost a brother from cancer, beginning in the lip, extending to the larynx, and finally killing him.

At the time I saw Mr. White, fully one-third of the lower lip was involved, and was in such a condition as to suggest the prompt and free use of the knife as the only means of giving any relief. It was one of those angry looking sores that is frequently met with in practice that suggests the idea of feeling grateful to think that the other fellow has the sore.

The clinical appearance of the sore was such that the free use of the knife was the only thing that entered my mind as a means of relief. The patient and the doctor both objected to the use of the knife, and, as a compromise, the blue was applied, with the understanding from me that I did not believe that it would do any good. Much to my astonishment, the sore began to improve, and in forty days was entirely well, and has remained so until now, and the man is enjoying excellent health.

This is an ideal case, where the results exceed all expectations; but I have observed many cases where the growths have disappeared, and open sores of long standing have been healed up by the use of the blue. I think it a most valuable agent, that has been overlooked, and I trust that this paper will result in its increased use, as it must necessarily prove beneficial to both doctors and patients.

DISCUSSION.

Dr. J. O. Stillson, Indianapolis.—I simply wish to ask one or two questions about the bactericidal properties of this drug. I understand the Doctor makes a solution in water—five grains to the ounce of water. Is it simply the aqueous solution of methyl blue that is taken up by the tissue that comes in contact with the bacteria and stains them, or is it necessary that this be used with some other bactericidal agency or anything besides water? We all know, of course, that in staining bacteria we first fix them on slides. Now the fixing process by means of heat is the killing process. I simply ask for information, because I do not know why it should act as a bactericide on account of its coloring; whether the re-bleaching by the Gram method might not bring the bacteria to life again.

Dr. Adolf Alt, St. Louis.—As soon as I had read Stilling's article, recommending pyoktanin (methyl violet) as an antiseptic, I procured it, and have, in a measure, been using it ever since. My first experiences I published in a paper in the American Journal of Ophthalmology, Vol. X., p. 314. I have experimented with it largely in eye diseases; and while I can also testify to its good qualities, particularly in the treatment of the lacrymal sac, I have had to abstain from it in my private practice on account of the staining. My patients did not want to go about with blue eyes. I have also used it in purulent otitis media, and when applying the pyoktanin solution in good quantity, so that the whole tissue is stained, you will find a very rapid and astonishing change in the discharge from pus to mucus. Some cases even get well in a very short time; others, however, do not. Whether this is due to the bactericidal power, I am unable to say. That it must have some kind of astringent quality, seems quite clear from the fact that the mucous membrane gets hard and dry after its application. I usually use one grain to the ounce. It acts sometimes a great deal better than boracic acid. I also quite recently found it to exert a most beneficial influence in cases of dry eczema of the meatus auditorius.

Dr. Coomes, Louisville, in closing, said: I have made no microscopical examinations, and simply assume that the cure must be due to its bactericidal qualities. You take tonsillitis;

we know it is a germ disease. In my practice they get well without trouble, and it is simply an assumption that it is by germ destruction. It is a great drier. I have a great many friends whose experiences with the blue have been similar to mine. The five per cent. solution gives considerable pain.

LACRYMAL OBSTRUCTION AND ITS TREATMENT.

BY DR. JOHN J. KYLE,

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ON account of the advanced ideas of the therapy of this condition and contending opinions regarding the early recovery of these cases, this subject becomes of more than passing interest to the ophthalmologist and likewise the general surgeon.

It is our intent to dwell upon those cases amenable to therapy and lesser surgical measures. As all know, certain cases, in spite of our efforts, persist in opposing every form of treatment other than the complete extirpation of the lacrymal sac and gland. The contribution of Dr. Holmes on this subject is probably the best at our disposal and needs no addition.

The embryonic formation of the lacrymal canaliculi begins about the sixth week. It is not always complete. In consequence we may find the groove partially united, many times, two or more openings presenting. These anomalous conditions are very rare and of no consequence.

The lining of the canaliculi is a continuation of that from the nose and conjunctiva, and is of a vascular nature. In consequence very susceptible to chemic and thermic changes. The mucous membrane is seen in folds and acts in conjunction with the little valve at the nasal opening as adjunct valves to prevent the regurgitation of tears, and the expulsion of air in blowing the nose—a disagreeable sensation often complained of in patency of the duct. It is to be noted that there is a constant suction downward in the duct, due to the peculiar anatomical construction and nasal breathing. This is demonstrated by the complete drainage that is often seen in

malformation of the puncta and want of perfect opposition of the lids to the eye-ball, and furthermore by the presence of foreign bodies in the puncta, such as cilia especially.

The function of the duct is to carry into the nose the secretions from the lacrymal gland, conjunctiva and other glands, so beautifully described by Dr. Alt in his original contribution on "Glandular Structures of the Eye and Its Appendages," thereby freeing the cornea and conjunctiva from extraneous matter.

By extraneous matter we refer to dust, infectious material constantly floating in the air, and micro-organisms which may accumulate and are washed into the sac, thence into the nose. Many of the latter are of no consequence, while others, such as the staphylococcus pyogenes albus and aureus, and staphylococcus epidermis albus of Welsh, are frequently found; and if any slight obstruction of the ducts allow them to accumulate in the sac, if not the cause of active inflammation they may at least keep up an irritation.

When the drainage is normal the inhibition of germ life in the sac and conjunctiva is presumed to be complete. Where the natural function of the duct is interfered with patients may have simple epiphora, dacryocystitis, lacrymal abscess, or necrosis of the bones forming the canal. Many cases of acute and chronic inflammatory conditions of the lids and cornea may, if not directly caused by the stenosis of the duct, be so retarded in process of recovery that direct attention is demanded before relief of the primary symptoms is secured. The operation of opening the canaliculi of the duct in no wise interferes with the function of the duct, so we should make free to open when indicated. Epiphora, being a symptom, should not be confounded with obstruction of the duct. When this symptom presents itself its cause should be carefully investigated. Epiphora following closure of the duct should be differentiated from that accompanying coryza, hysteria, preceding tabes dorsalis, hyperesthesia of the retina, anomalies of refraction, thermic and chemic change.

Cause.—The cause of the alteration in the natural lumen of the duct or inflammatory changes, other than those mentioned, are many: during the passage of the child through the vagina or in manipulation, or fall in infancy, pressure is so

made as to affect the canal. Haab speaks of hereditary predisposition as a cause. Then we have the classical extension of an inflammatory condition from the conjunctiva or Schneiderian membrane, the vascular supply being so great about the little nasal valve that the latter is more often a cause than any other. Especially is this the case in children poorly nourished or of a strumous diathesis.

It is very easy, for exfoliation of cells within the duct and mineral deposits from the tears, to become enveloped in the little folds of the mucous membrane, and eventually lead to stricture and narrowing of the duct.

Diphtheria by extension through the tear duct, and exanthematous diseases which especially involve the mucous membrane of the eye and nose, fracture of the lacrymal bone, and deflection of the septum, may also lead to obstruction.

In those subjected to the dust of cities, and in travel, the irritating effect of gases, especially natural gas, or any irritation that may cause a prolonged hyperæmia of the conjunctiva, are more susceptible to disease of the duct.

The alteration in the peculiar anatomical position of the puncta, especially seen in the old, due to old catarrhal trouble and natural loss of elasticity, may be classed advisedly as a cause. Under such conditions the puncta takes on a variety of forms, standing in cone shape, turning in or out, and may be widely expanded with partial prolapse, as it were, of the immediate canal, or so contracted and obscure that only an intimate knowledge of anatomy of the lids will enable us to find the natural opening.

Symptom.—In many cases the only symptom complained of for years will be the epiphora constant or upon exposure to cold winds, in others purulent inflammation with abscess will soon follow; again only a mucocele, emptied at will of the patient by simple pressure. These conditions continue with more or less severity and variation until patient is compelled to consult an oculist for relief.

Treatment.—In the infant and new born, treatment promises a more speedy relief than in the old. The sooner we resort to operative measures in the young, as well as the old, the better for the patient.

The present article deals especially with sub-acute and

chronic cases in which we are able to pass a probe through the duct.

The following illustrate the character of the cases usually seen in the infant:

Case I.—Babe, five days old, distinct mucocele of the left lacrymal sac; upon pressure contents of tumor readily expelled. The infant was, on the seventh day, anæsthetized, duct opened, and No. 5 probe passed. On the following day No. 2 probe passed and duct irrigated. The irrigation was continued for a few weeks, when complete recovery resulted. What was the probable cause in one so young? Evidently a congenital closure of the lower end of the duct.

Gunn (*Ophthalmic Review*, Feb., 1900) remarks that "the secretion, if it exists in fetal life, is very slight." In addition, I might add that as soon as the child makes its exit into the world the function of the glands of the eye, like those of the entire body, are stimulated into action, and that of the conjunctiva is usually a vigorous one. In a few days the sac and duct is filled to overflowing, if there is any nasal obstruction, and with the enforced distention the mucocele readily develops.

Case II.—Child, four years of age, of a strumous diathesis, an offensive catarrhal condition of the nose, with an eczematous condition about the meatus of the nose so conspicuous at times in these cases. There had occurred, some time before consulting me, an abscess of the duct and rupture, with the formation of a fistula. Fluids injected into the duct would pass through this opening. Under an anæsthetic the duct was opened and No. 5 divided probe passed and left in position for two days, with cold applications and bandages to prevent injury. After this the duct was irrigated daily, care being taken to see that the fluid, protargol, 5 per cent. solution, passed into the bony channel. A small No. 2 probe was occasionally passed. After three months child made a perfect recovery.

Case III.—Woman, aged thirty, complained of simple epiphora, prolific at times, for years. The duct was slit and a No. 4 divided probe passed with great difficulty and considerable force. The entire duct was occluded. The probe fit as solidly into the duct as a nail in a board. Cold applica-

tions were recommended and probe allowed to remain in position for four days. It soon began to loosen, absorption being stimulated about the probe, and on the fourth day the probe was readily reinserted after irrigation. This was removed every other day for a week following, when it was removed permanently. The irrigation was continued with collyrium of the protargol. In that case there had been a gradual erosion of the mucous membrane from fungi in the duct or extension of the disease, causing stricture and ultimate obliteration of the canal.

I am sure that in the treatment of such cases as the above the radical good resulted from the continued distention of the canal, by allowing the probe to remain in position, and subsequent irrigation with the protargol.

Case IV.—Mrs. S., aged thirty-five, strong and well nourished; diagnosis chronic dacryocystitis; duct opened and No. 6 probe passed and allowed to remain in position for three days. Removed probe, irrigated with protargol, and probe reinserted; on second day following probe removed and small lead style inserted. The style was worn for two weeks; canal irrigated daily with protargol. Patient then returned to the northern part of the State, free from further trouble.

These cases enumerated I think typical of those that present themselves amenable to simple treatment. It is very important for us to remember that the narrowest part of the canal is at the emptying of the sac into the duct, and that the knife must pass into the duct, completely dividing the stricture and even normal fibrous bands.

In the recital of the above cases I have dwelt on the use of the divided probe, which, as you see, when passed into the duct the protruding portion is readily detached. It is better, I believe, to leave the original probe in position than to remove it at once and try to insert styles, etc., subjecting the patient to additional torture. By leaving the probe in position for a few days disintegration of the bands of connective tissue and deposits are stimulated, and a permanent patency of the duct is more easily established.

The size of probes indicated in the treatment of these cases is still a debatable question, there being no positive rule in regard to size. It has been my observation that we

should begin with the large probe in old cases—No. 6, if possible—allowing it to remain in position as indicated above, freeing the duct afterwards with small probes, that is, those which pass with ease into the duct to restore the normal caliber in the duct.

The condition of the nose in all these cases must have our very careful consideration. Often surgical attention of the lower turbinate or septum is indicated.

My observation is that the careful attention to the therapy of the nose does not play the important part in the cure of stenosis of the duct that is claimed by some writers.

Where there is patency of the duct in acute cases great care should be taken in the passage of sounds for fear of unduly wounding the mucous membrane, relying more especially upon the irrigation to restore the normal calibre of the duct.

The attention of the profession in this country was in 1898 first called to the silver salt, protargol, introduced by Neisser. Since that time I have used this drug in varied solution as irrigation and collyrium, with uniform good results in treatment of cases of this character.

One word further relative to the efficiency of protargol.

Some eight months ago a patient with senile cataract and chronic dacryocystitis of left eye (the right having been previously operated on) consulted me. On pressure a great amount of yellow fluid was exuded from the puncta, at times glueing the lids together at night. The duct was opened and small probe passed. The following day I left the city and instructed the passage of probe and irrigation to assistant. In a week I returned and found the duct totally occluded, nor could I pass the sound, the assistant having failed the second day. The sac could be easily irrigated. The patient informed me that he could not remain longer in the city and demanded that I operate at once. I explained the danger of infection, but he promised to take the chance. The sac was irrigated with 10 per cent. protargol and the eye flushed with hot 5 per cent. protargol and lens removed. There followed no subsequent inflammation, and patient made a perfect recovery. The cystitis continued to trouble the old gentleman until his death, a few weeks ago.

Others have previously indicated the value of solution of protargol preliminary to cataract extraction.

DISCUSSION.

Dr. A. Alt, St. Louis.—There are a few points in which I cannot agree with the essayist. First to the main point. Dr. Kyle says that slitting the canaliculus does little or not interfere with drainage. My experience is to the contrary, and although I never in former years slit the lower canaliculus, but always the upper one (whenever this was possible), I have seen cases again and again in which no sucking up of the tears took place, although I could easily pass a large Bowman probe. From these considerations I have for about 10 years returned to the method inaugurated by Otto Becker, while I was a student at Heidelberg, namely, that of dilating the punctum with a conical dilator and then introducing a probe. I find that such a non-forcible dilatation of the punctum will admit a No. 5 and sometimes a No. 6 Bowman. As far as we can expect good results from this treatment alone, I am surely much more pleased than I was formerly when slitting the canaliculus. Of course in all of these cases the conditions of the nose should be carefully examined into, and any abnormalities be treated. As regards the injection of fluids into the tear sac, I also wish to take a different stand from the essayist. At least I would advise great caution in this direction. It certainly has occurred to others, and a number of times it has occurred to me, that the wall of the tear sac gave way under even a slight pressure, and the fluid was forced into the surrounding tissues, causing severe reaction and even abscess formation. I have in consequence given up routine syringing and apply this treatment with hesitancy only. The Theobald probes I have seen used, but never used them myself. With regard to the removal of the lacrymal sac and gland, I would prefer to be conservative. Patient, though long continued, treatment will often lead to a cure and to proper function, without having recourse to such a heroic measure. The cases in which the latter is absolutely necessary are, in comparison, but few.

Dr. Derrick T. Vail, Cincinnati.—There are one or two points which I would like to mention in connection with this very live and interesting subject. One of these is in reference to a certain quiet form of dacryocystitis which we do not recognize or do not even suspect until it is too late. I

refer to the caseous deposit of decayed septic matter which sometimes exists in the lacrymal sac in certain aged people who are about to be submitted to an operation for cataract or iridectomy. There are no symptoms of dacryocystitis whatever. If you press on the sac the result will be negative. Should you ask them if their eyes water or if they ever had any tear-duct trouble of any kind, you will usually get a negative or unsatisfactory answer. The chronic conjunctivitis always present in these cases may entirely escape your notice, for so many aged people have those thickenings and calcareous deposits in the conjunctiva that it is easily overlooked. The only way in which caseous dacryocystitis is to be recognized is by dilating the lower canaliculus with a Galezowsky dilator and using Anel's syringe with warm salt solution, driving the piston down gently and thus allowing the solution to wash out the sac. If necrosed tissue and old spores are present in the sac, masses will be regurgitated into the conjunctival sac through the upper canaliculus.

Less than a year ago an aged lady came into my office to consult me about her left eye. She had a simple senile ripe cataract. She had had her right eye operated upon for cataract three years previously by a very able oculist of this city, but the eye was lost through panophthalmitis, and she was very loth to have her left eye operated upon, as she feared the same disaster might result. She presented neither the history nor the symptoms of dacryocystitis, but I used the Anel syringe in the manner described and found quite a quantity of thick cheesy substance in the sac. Had this condition been unrecognized and an extraction performed, the result would surely have been fatal to this her only remaining eye. Being unwilling to pass through the radical operation of extirpation of the lacrymal drainage apparatus, I simply sealed the puncta with the galvano-cautery. A short time afterward I extracted the cataract and had an ideal result. She has her sight to-day.

Another point which I would like to mention is in regard to the differential diagnosis between real purulent dacryocystitis and those circumscribed inflammations simulating it. I have seen two cases during the last year which looked exactly like acute purulent dacryocystitis, but were in reality

pseudo-dacryocystitis. The symptoms all seemed to be those of genuine abscess of the tear sac—the swelling, throbbing pain, fluctuating tumor and epiphora were all present, and yet in neither of these cases was there the slightest affection of the tear-sac proper. The trouble arose from the nose. Both of these patients had necrosing ethmoiditis, and some of the infectious material from the anterior ethmoidal cells had dissected outwards under the periosteum of the lacrymal bone, stripped up the membrane and formed a sub-saccular abscess. If this has occurred twice in my experience in a year's time it certainly is more common than one would think, and it behooves us to be on the lookout for these cases. In both of these I syringed the tear-sac through the canaliculus and the water passed down through the nose and came out *perfectly clear*. If there had been an abscess in the tear-sac it is evident that the water would either not have passed through at all, or, if so, would carry along with it the contents of the inflamed sac. In one case I curetted the ethmoid cells through the nose, and it was found that the inflammatory process there was gummatous in character. In the other case I made an outward incision, being very careful not to wound the tear-sac. Both the cases went on to perfect recovery.

Dr. J. O. Stillson, Indianapolis.—I think that there is one point on which we all will agree, and that is that these cases are the *bêtes noires* of the ophthalmologist. If there is anything that does try the patience of Job it certainly is a case of dacryocystitis which has run on until there is a stenosis of the duct. The continuing of these cases in our practice for years sometimes is enough to worry the life out of a man. The size of the probe I do not think cuts so much figure in curing the disease as the manner in which it is inserted. In regard to the slitting up of the lacrymal duct, it seems to me that common sense (with all due respect to Dr. Kyle and the gentlemen who agree with him) would suggest the unreasonableness of this procedure. The proposal to slit up a tube and then expect it to retain its suction power seems to me hardly tenable. I think if we will remember one little thing about these cancliculi it will enable us to grasp the idea with a little more reason and common sense. We all know a syphon will suck uphill and then downhill. We know the canaliculi are

like syphons, especially the upper, the lower one being more of a drainage tube pure and simple. Some years ago I abandoned slitting the lower canaliculis because I found when I did it the eye would weep in spite of everything. I found in the cases where I did succeed in slitting the upper canaliculus I would get drainage and not deprive it of its power of drawing tears out into the sac. If you use the upper you will get a better result than if you use the lower canaliculus. Like Dr. Alt, I have found by dilatation I could get in a probe pretty well where I was in the habit of slitting. I have also found in cases where ladies especially would not submit to the knife, I have been able to pass a filiform bougie (and passed it readily), and thus would get the canal open. In passing the probe through the upper canaliculus, having first employed dilatation by gradually increasing the size of the probe, you can accomplish everything that can be obtained by the slitting up of the lower canaliculus. The chief trouble in slitting the canaliculi is to get them to remain open. I have had a number of these cases where the opening would get smaller and smaller until I would have to insert a filiform bougie. Unfortunately my operations for the total extirpation of the sac have not been followed by the results recorded by the essayist. Where I have taken out the sac I have had to take out the gland also. I think the operation recommended by Dr. Holmes a good one, but I would not recommend it in all cases. I would employ it where there was a complete stenosis and the tears forming continuously.

Dr. Christian R. Holmes, Cincinnati.—I have never been wedded to the use of very large probes. One reason is that the lacrymal canal is lined with erectile tissue of the same type as we find upon the inferior turbinated bodies. Years ago it was a common thing to see patients sitting in the office of specialists with large rubber bougies in their nares. The idea was that the pressure on the inflamed erectile tissue would cause restoration to its normal condition. We know now that this is not practical. And as virtually the same structure is present in the tear ducts as in the nasal canal, I have never adopted the forcible distension or laceration of these parts. We know that if we lacerate the parts in any way we have sooner or later cicatricial contractions following this pro-

cedure. I am content nowadays to use a moderate sized probe, and I do not slit the canal as often as formerly. There is one thing we must not forget, and that is not to commence to treat the tear duct from the wrong end. The eye is not the seat of infection except in a very small percentage of cases; the infection comes from the nose. This has been demonstrated beyond a doubt, and we must therefore not forget that the nasal end must be attended to first. A great many cases of eye trouble have been relieved by removal of hypertrophied tissue from the turbinated bodies, of polypi, opening of accessory cavities or reduction of localized inflammation. When I speak of removal of hypertrophies from the turbinated bodies I mean only to restore them as nearly as possible to the normal condition, only to remove the diseased tissue to permit free ventilation of the nares and reduce inflammation, which so often involves the outlet of the tear duct. The opening of this canal is so small that at times you can scarcely find it. In some cases it opens high up under the inferior turbinated, while in others the duct passes obliquely through the mucous membrane, emerging as much as 10 mm. farther down. It is through this end of the tube that the trouble begins in 90 per cent. of our cases.

We know that cataract cases have been lost again and again by the lack of attention to the tear sac. I will cite a case which illustrates this point in a forcible manner. One of our most able men in the West removed a cataract from the eye of a woman eighty years old. Panophthalmitis and enucleation followed. The cause of this trouble was failure to recognize an old latent affection of the tear sac. She came to me four years afterwards and desired an operation for cataract upon the other eye. By pressure there was no evidence of any trouble in the tear sac, but careful syringing brought away a small amount of cheesy material composed largely of pus-forming bacteria, a condition in which slitting, probing and washing could not absolutely guarantee against infection of the corneal wound, even if she had been willing or able to undergo the sufferings attendant upon such proceedings, which she was not. I therefore removed the tear-sac and seven weeks after extracted the cataract with perfect result. Therefore in all our cataract cases we should examine the

tear-sac to ascertain if there be any infection. I practice the radical operation, *i. e.*, complete extirpation of the lacrymal sac and glands, and have written something on this subject, reporting seventen cases up to March, 1898; the result was perfect in all of them, and I have had a number of cases since then which I have not reported, but which have had equally good results. The cases reported were operated upon at various times during the ten years preceding the re-examination in 1898. Some of them had a single and some a double operation, and every one of them was in perfect condition. To obtain such results we must remove every portion of the lacrymal glands. It is difficult to secure all of the scattered accessory glands, but unless you do you will be surprised to see what an activity the remaining gland tissue will take on afterwards, and more or less epiphora will continue. You need not be afraid to extirpate every vestige of both the large and small glands for fear that the eye will not be properly lubricated. The minute glands of Krause, which, to the number of thirty or forty, are located in the upper lid, and a few in the lower, aid largely in supplying all the necessary secretion. Should any one of you desire detailed information on this subject, I beg to refer you to my article in the *Archives of Opthalmology*, Vol. XXVIII., No. 1, 1899.

Dr. Vail spoke of peri-saccular abscess. I have a case which I hope to show before the other section to-morrow. He came during my absence, suffering from dacryocystitis, the phlegmonous swelling over the seat of the sac rupturing a few hours after his admission to the hospital. The nares on the same side were inflamed, discharging muco-pus, and containing a number of polypi and hypertrophied tissue on the turbinated bodies.

My first assistant, Dr. Chas. H. Castle, removed the polypi and hypertrophies, and opened the anterior ethmoidal cells. Syringing and treatment of the sac failed to stop the discharge, and he then extirpated the sac and gland. The wound over the seat of the sac healed promptly, but after several weeks inflammation appeared again where the sac had been. I found the patient in this condition upon my return to the city. The inflammation involved all the accessory cavities on the right side of the head. I opened the right frontal

sinus through a free external opening, and found the cavity very large and filled with pus and polypoid tissue. I also found the ethmoidal cells diseased, and removed their walls. On account of the duration of the operation and profuse bleeding, I determined to finish the operation at another time. Accordingly after two weeks I opened the antrum through the canine fossa, and found it filled with polypi and pus, with necrosis of the bone in the region of the tear-sac. I removed all diseased parts, including a part of the nasal wall, to give permanent ventilation and drainage to the cavity when the opening in the canine fossa should be permitted to close. The sphenoid cavity was also opened and contained pus, but not any polypoid tissue.

The point I desire to make is that the first symptoms to which this patient paid any attention were those of dacryocystitis and its complications, which after all were only secondary, and due to extension from the accessory cavities. All secretion has ceased months ago. It only remains to close what is now a small opening over the frontal sinus. This case certainly demonstrates that there are cases of dacryocystitis whose origin of infection is from the accessory cavities. Strange to relate, the patient before mentioned had never suffered from headaches or any pain or inconvenience, excepting from free discharge from that side of his nose, until the tear-sac became involved, fifteen years ago, which, however, had never given him enough concern to cause him to seek relief. All of the cavities have healed. I should not feel safe in relying upon sealing of the tear-duct if the sac was infected, because of its liability to become *unsealed* at any time, and if the sac is not infected there can be no reason for the operation.

Dr. W. L. Dayton, Lincoln, Neb.—I feel a good deal like Dr. Alt does in regard to this matter, and I cannot agree with Dr. Kyle in his assertion that slitting up of the canaliculi does not interfere with the proper drainage of the eye. I believe that it does, and for that reason for the past few years I have been probing the duct through the punctum when I could dilate it so that I could get a No. 5 probe in, and in a very large patulous punctum a No. 6. I find where there is just a slight stenosis that this often suffices. Where there is

a fibrous contraction or stenosis of the duct, and the sac is free from acute trouble, then I think it is necessary to slit up the canaliculus and use, not a No. 5, 6 or 8 probe, but a No. 10 or 12 Theobold size, and even up to No. 14. I can recall the case of a child, five years old, whom I had under treatment for some time, who had a complete stenosis. An abscess which had formed ruptured externally and there followed cicatricial stenosis. I kept the duct open with small probes for some time—several weeks—and for five or six weeks there was no improvement. I then used a No. 12 Theobold probe on this child (remember, only five years old), and in four applications of the probe the child was so much improved that it returned home. That required probably ten or twelve days. I did not repeat this operation day after day. After returning home the child remained well. Now that No. 12 probe entered the duct very nicely without much more pressure than I used to pass the No. 5, and the sac was not injured in its passage. Now in regard to the tearing of the sac so that fluids would enter the tissues. Undoubtedly tearing is frequently done in forcing a large-sized probe through the punctum even when no false passage is made, and when in such cases we afterwards force fluids in through a small lacrymal syringe, œdema and possibly an abscess results on account of the fluid escaping into the surrounding tissues. For this reason it is my practice for the first few times, after having probed and found much resistance, to use gently a very mild solution of bichloride or any other agent. As to extirpating the sac entire, I am certainly not in favor of it so long as we can establish a patency of the duct by means of large probes. It certainly requires, if this radical operation is performed, an extirpation of the lacrymal gland also, otherwise we have the epiphora continuing. The use of the large probe I have carefully investigated (of course I have not had a large clinical practice), and in my own practice I have never had reason to turn them aside for the smaller probes. For that reason I would encourage the use of the larger probes to the exclusion of the radical operation for the removal of the lacrymal sac.

Dr. C. Barck, St. Louis.—I do not believe that I can add anything new to what has already been said. The rules which guide me in these cases are absolutely conservative. In the

first place I believe that recent cases, those which have existed only a number of days or weeks, can be cured without slitting the canaliculus, and whenever we can get along without doing so this is certainly preferable. I agree with Dr. Alt and Dr. Stillson, that it is a great mistake to slit the lower canaliculus, and I have never done it. I have always emphasized the point that the lower canaliculus is the most important for the suction of the tears, and, if slit, it will not perform its function as well as in the normal state. As to probing and injections, I think that the force admissible is largely a matter of experience. We know that too forcible probing is not to be done. I believe that injections are possibly more dangerous than the use of the probe, simply because when you use the injection and rupture takes place you cannot tell how much of the fluid escapes into the adjacent tissues, and cannot control the exact amount. I have discarded the use of the very large probes; I hardly ever go beyond a No. 10 and as a rule not higher than a No. 8 or No. 9. As far as the radical operation is concerned, I believe it ought to be limited to such cases where there is an impermeable stricture or osseous closure. In a number of very obstinate cases, where treatment extended over one year, and where I had at first thought of extirpation of the sac, the result was a complete recovery, observed for years. The cases in which I have extirpated the lacrymal sac and gland have been those which were brought about by injury or disease of the bone, resulting from syphilis, etc.

Dr. M. F. Coomes, Louisville.—I would like to add a few remarks to what has already been said. In regard to rupture of the sac, I have seen it occur time and time again. Fortunately in my cases I have not had an abscess result from the escape of fluid into the tissues, possibly because in the early stages I used antiseptic solutions. In regard to slitting up the canaliculi, I think Dr. Kyle will find out in years of experience that the less often he does this the better off his patients will be. There is no question but that the function of these parts is impaired by such a procedure, but at the same time in some cases we are forced to do it. I have found in treating chronic abscesses of the sac there is nothing like good free drainage, and in treating these strictures to adopt

the means for the fullest distension in the beginning, passing in the large probe and keeping the canal open if possible. In regard to the extirpation of the sac, I am not ready yet to accept the doctor's radical treatment. In all my experience of twenty-five years I have never had occasion to extirpate the sac. I further think when you extirpate the sac the lacrymal gland will have to come out. If you do not do this you will certainly have a constant epiphora. Unless you remove the gland you have simply gotten rid of one part of the trouble. I think Dr. Holmes after a few experiences will not feel like extirpating so many sacs as he does now.

Dr. J. J. Kyle, Indianapolis.—I do not believe I have very much of anything to add to what has already been said. I have enjoyed the discussion very much, and feel that I shall be a little more conservative in slitting the duct after this. I think the conservative passage of the probe (a No. 2 or No. 3) into the duct will possibly do no harm and its use will sometimes clear up the diagnosis.

DACRYO-STENOSIS WITH ABSCESS.

BY DR. J. F. REYNOLDS,

MT. STERLING, KY.

DACRYO-STENOSIS with abscess is the most important disease of the lachrymal duct. Not only does it give rise to grave affections and sometimes fatal septicemia, but in consequence of its tendency to cause congestion of the conjunctiva and appendages of the eye, it undermines the whole nervous system and unfits the patient for the ordinary avocations of life. It is nearly always secondary to dacryo-cystitis, the development of which is favored by foreign substances, as dust, smoke, irritating gases, etc.

Blennorrhœa adultorum and blennorrhœa neonatorum play a very important part in the causation of this disease, for they almost invariably leave cicatrices sufficient to cause stenosis of the duct, which is sooner or later followed by abscesses. According to "Fuchs," heredity undoubtedly causes a small per cent. of these cases, from ill-formed noses, which are handed down from one generation to another. It is often

caused from hypertrophy of the inferior turbinated, especially in those who suffer from specific troubles, either acquired or congenital, and from all nasal affections where the pathogenic fungi enter the nose. It occurs in all classes and at all ages, but chiefly in men of mature years, and especially employes of our various factories and railroad systems. It is by far the most frequent between the age of twenty-five and fifty years. Males are attacked more often than females, and women of the higher classes who are not subjected to hard labor rarely suffer from this disease. Chronic alcoholism is a causative factor, for the reason that it produces chronic congestion and catarrh of the lachrymal duct, and thickening of the mucous membrane and connective tissue. Necrosis of the lachrymal and nasal bones is also a frequent cause of the abscess. Its course is a very rapid one. Usually on the third or fourth day we can detect pus by palpation and the discoloration of the skin.

After a brief mention of some of the most important symptoms, we will hasten on to the consideration of the treatment. (1) Epiphora is almost the first symptom to appear; (2) redness and heat; (3) swelling, at first hard and painful on pressure; (4) great œdema of the lids and surrounding tissue; (5) congestion of the conjunctiva with chemotic patches; (6) dryness of the schneiderian membrane and the corresponding side of the nose seems to be stopped up; (7) non-permeability of sac; (8) fluctuation makes its appearance on the third or fourth day; (9) lachrymal sac can easily be outlined after it is distended with pus; (10) in order to ascertain as to whether or not there is complete occlusion of the duct, it is best to inject a few drops of a normal salt solution into the lower canaliculi with a small lachrymal syringe, and if there is an opening it will enter the nostril of the corresponding side.

The treatment should be directed in two ways, viz.: to kill the micro-organism and remove the obstruction. In the beginning of the abscess, that is during the first two or three days, we should use abortive means, such as irrigation and syringing with antiseptic solutions, the use of astringent fluids, of which a one per cent. solution of silver nitrate acts admirably; ice bags alternated with hot applications are beneficial when the patient will tolerate them.

The Bowman probe should rarely be used unless it is in the hands of one skilled in its use, and then the tissue should be thoroughly cocainized in the region of the duct by injecting the cocaine into the canaliculi with a small syringe. If the stenosis is marked, the duct and surrounding tissue should be anæsthetized by hypodermic injection of a four per cent. solution of cocaine, or better still the use of a general anæsthetic; for Dante has never pictured the horrors of the lost souls with more anxiety and dread than these poor sufferers show when they are about to be subjected to this painful little operation. If the stricture is hard and of long standing, the probe should not be forced through without first cutting it, and never used when the inflammation is very great, for by its use we are liable to make a false passage and produce a solution of the continuity of the mucous membrane, which leads to the formation of cicatrices and impairs the function of the tear passage. Injection of medicine into the canaliculi is not without its bad effect on the future course of the disease, for it acts as an irritant to the lining mucous membrane, increases swelling, extends suppuration and thereby prolongs the duration of the disease, and makes an unfavorable prognosis. The radical operation should be performed as follows:

Make an incision through the skin and subcutaneous tissue—beginning at the center and at the lower margin of the tendo-oculi—extending downward and outward about one inch, so that the lower part of the incision will be on a line with the inner schlero-corneal border of the normal eye; dissect back the skin and subcutaneous tissue, and with a pair of strabismus scissors make a complete dissection of the lacrymal sac and duct from where the latter enters the osseous canal up to the bifurcation of the canaliculi. The remaining portion of the duct down to the pituitary membrane should be incised in several directions by means of a narrow knife of the shape of a right angle triangle, as recommended by "Stilling," by allowing the knife to move up and down several times, rotating it on its axis after the sac and nasal duct have been completely removed, take a medium sized Bowman probe, pass it into the canaliculi through the puncta lacrymalis until it is felt in the wound by the tip of the finger, then place the point of an electric cautery probe, about the

same size, in apposition with Bowman's, gradually withdraw the latter, at the same time following it up with the cautery until it is seen in the puncta, turn on the electric current until this probe reaches a white heat, at the same time guarding against any injury to the eyeball and surrounding tissue. After having carefully removed it we have a wound that is absolutely free from all germs and their toxines and a tube without any lining mucous membrane, the sides of which readily come in apposition and heal by granulation; therefore we have substituted for these infectious canals a cicatricial tissue that is firm and healthy, and thereby have destroyed the incubator for all bacilli that so easily migrate to the inner canthus of the eye; besides, these patients are permanently relieved from the unpleasant task of squeezing the tears from the mouths of the canaliculi, as usually happens when the ducts are allowed to remain open. I am a great believer in palliative treatment and conservative surgery, but I think it out of place in a case of dacryo-stenosis of long standing with a recently developed abscess; for in every case of this character we should neither delay nor hesitate to perform the radical operation as soon as the diagnosis is made, and even before the abscess has ruptured spontaneously or opened with the knife. If the sac is fully distended with pus we can in a great many cases, by careful dissection, remove it without rupturing the sac, which gives the operator a much better chance to make a complete removal without injuring too much of the surrounding tissue. There should be a total extirpation of the lacrymal gland, as recommended by "Dr. Holmes," in almost every case where the duct and sac have been removed, especially in those persons who lead an outdoor life and are constantly subjected to the wind and dust; for if this gland is not removed these patients are annoyed for life by tears and conjunctivitis caused by the constant wiping the eyes. I do not claim anything new in the cautery treatment, for the application of cauteries in their various ways in this operation are as old as the surgery of the sac itself; but the results obtained in the cases upon which I have operated by above described method convinces me that the application of the cautery into and through the canal fulfills all the requirements. One advantage it enjoys over the slit-

ting method practiced by some is the conservation of symmetry and form to the palpebral margin, which results could not be so easily or surely obtained after an open wound. I quote you three cases which have come under my observation during the past eighteen months:

Case I.—T. F., æt. 58, male, applied for treatment November 19, 1899, with the following history: Was kicked on the nose by a horse June 18, 1890; had considerable redness, pain and swelling for several weeks afterwards. When the inflammation subsided, the lacrymal duct was stenosed and the tears were continually overflowing, causing no little inconvenience. In 1896 the sac abscessed, at which time he consulted a reputable specialist, who operated and removed a small quantity of necrosed bone, and directed his after-treatment to the use of Bowman's probes and syringing the duct with antiseptic solutions. This treatment was continued for three months, when the patient was discharged cured; still more or less tearing continued until November, 1899, when the second abscess made its appearance. After six weeks of careful syringing and probing, without any marked benefit, I performed the radical operation under a general anæsthetic, removing the entire sac and duct, with a small amount of necrosed bone, from the pituitary membrane to the bifurcation of the canaliculi; then with the electric cautery point I carefully cauterized the canaliculi to the margin of the lid, applied two silk sutures, dressed it antiseptically, had primary union in the lower part of the wound, the canaliculi healed by granulation. Complete recovery.

Case II.—B. J., æt. 42, male, first consulted me August 5, 1900, with history of having had stenosis with muco-purulent ectasia of the lacrymal sac of the right side for the past six months. Three days prior to my seeing him an abscess had begun to form, with all the symptoms common to this disease. I proceeded at once to do the radical operation, under cocaine anæsthesia, observing strict asepsis. I made a complete dissection of the sac and tube, using the cautery point as in Case I. After taking two deep catgut and two subcutaneous silk sutures, the wound was antiseptically dressed, union taking place by first intention in the lower part, the canaliculi healing by granulation. This patient, being a farmer by oc-

cupation, was continually annoyed by the excessive accumulation of tears caused by wind and dust, and being willing to submit to almost anything to get relief, I removed the tear gland October 20, 1900, after having shaved the entire eyebrow and made every preparation for an aseptic operation. Primary union and complete recovery followed, with sufficient tears to lubricate the membrane of the eye.

Case III.—J. C., æt. 65, male, twenty years ago suffered from purulent ophthalmia for about one year; since that time he has been more or less troubled with tears running over the lids and flowing down the cheek in sufficient quantity to irritate the skin. December 1, 1900, an abscess developed, and four days later I was called and made an incision, and a large quantity of pus was evacuated. I washed it out with H_2O_2 and other antiseptic solutions, and continued this palliative treatment with but little benefit until January 3rd, when, under cocaine anæsthesia, I removed the sac and tube, cauterizing the canaliculi. The union in this case was the same as the above cases, and the patient was apparently well until three weeks later, when a subcutaneous abscess made its appearance, which was opened and washed out with a two per cent. solution of silver nitrate. Recovery uninterrupted; patient well, but still greatly inconvenienced by the accumulation of tears.

DISCUSSION.

Dr. F. A. Phillips, Chicago.—I would like to say a word or two in reference to the conservative treatment of these cases, especially the cases of blennorrhœa of the sac which have not as yet developed the acute suppurative condition; in other words, those cases in which an abscess proper has not developed. It is in these cases that we get early the symptom of epiphora, and it seems to me at this time that conservative treatment is advisable. If seen thus early dilate the punctum, then with Anel's syringe or a lacrymal pipette, wash out the sac carefully, and if the solution passes through into the nasal cavity do not pass a probe. It is and has been my practice for the past two years to probe no case for at least a period of two or three months, and if I find then the epiphora continues, and the stenosis of the puncta is not relieved by dilatation, I take a pair of Stevens' tenotomy scissors, and

after introducing one blade within the canaliculus make an incision from one and one-half to three millimetres in length. If the punctum is inverted—that is, rotated toward the eyeball—I turn the outer blade so that it points outwards towards the outer border of the lid in order that the incision may pass obliquely across and leave an opening into the canal lying in the lacus lacrymalis. I have found by this conservative method of treatment that many of these cases will be relieved and go on to recovery. Where cases have gone on to the condition in which a chronic suppurative process is present it is important to obtain an opening, a large one, and keep it open. This can best be done by inserting a stylet or the probe mentioned by Dr. Kyle. In two such cases as have just been described, I had to operate because I was not able to relieve the patients of the suppurative process by treatment. The probe if passed continually would maintain the patency of the canal, but after a discontinuance of from one to three months they would return with the suppuration and epiphora; I should have considered them fortunate if they had only epiphora. In the majority of cases of chronic suppurative dacryocystitis one of two things will result: either suppuration ceasing, contraction takes place with the closure of the duct so that epiphora is constant, or the suppurative process recurs and the patient will have to apply again and again for treatment. Such has been my experience. I have seen these cases recurring year after year, and they would come back once or twice a year for treatment; so my experience has made me very conservative in the matter of passing probes. I have seen a number of cases of suppuration produced by the early use of the probe where there had been prior to its use but a simple blennorrhœa of the sac. For that reason I wish to call attention particularly to the conservative treatment: first, by using dilatation of the punctum and the flushing out of the apparatus with a saturated solution of boracic acid; and second, avoiding the use of the probe until such time as you are confident stenosis exists in the lower part of the apparatus, in the bony canal.

Dr. S. C. Ayres, Cincinnati.—In regard to the treatment, I have pursued the methods which most of you have adopted—washing out the tear sac and then treating it, dilating the

canaliculi, passing a probe into the nose before making an operation. I do not believe, however, that I have been quite as fortunate as some of you in treating obstructions in this way, for after my patients were apparently well they would occasionally come back with a return of the epiphora; and in these cases I simply slit the upper canaliculus, pass a probe, and in a little while the patient is well. I have very positive ideas in regard to slitting the canaliculi, and it is surprising when one looks up this subject in the text-books to find how different authors recommend slitting, sometimes the upper and again the lower canal. Anyone who operates upon the lower canaliculus knows how much twisting of the tissues one has to make in order to get into the sac, so I do not think one is ever justified in operating through the lower canaliculus unless he cannot for some good reason utilize the upper.

Dr. J. F. Reynolds, Mt. Sterling, Ky.—I do not feel that it is necessary for me to enter into further discussion of this subject. The able discussion of the papers of this symposium to which I have listened, by such eminent teachers and practitioners, have been to me personally a source of great satisfaction, besides they have brought out a number of points of very valuable information, which will be beneficial to me in the future.

NERVE RESECTION, AS APPLIED TO THE SUPRA-ORBITAL AND NASO-LACRYMAL BRANCHES OF THE FIFTH PAIR.

By J. O. STILLSON, M.D.,
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THE surgical procedure indicated by the above title seems to have passed out of the minds of the operators of the present day and to have been relegated to the dump-heap of technical science, so to speak, and to have been replaced by improved modern methods which have had a tendency to draw the attention of the surgeon away from the orbit and the eye, and center his base of attack on the nasal vault as the seat of the enemy's stronghold in the vast majority of those aggressive and painful reflex neuroses which still go under the general appellation of orbital and supra-orbital neuralgia. We

hear much and see a great deal of optico-ciliary neurectomy, and doubtless in many cases we meet with some very good results from this operation. The more difficult and vastly more dangerous operation for the resection of the superior cervical sympathetic has become a popular operation for the radical cure of those disorders to the visual apparatus, having for their initial cause a preponderance of intra-ocular pressure, and passive congestion, so to speak, in the capillary circulation, which is controlled by the vasomotor system of nerves in and about the uveal tract and ciliary body, the result of which we see in the expression of pain, more or less rapidly decreasing visual acuity, and tension of the globe. If we, in our zeal, sometimes allow fashion to influence us, we may be able to bring our minds readily to the adoption of an operation like optico-ciliary neurectomy, where the arguments *pro* and *con* are not so unevenly divided. The successful severance of all interconnection between both globes, so far as nerve influence goes, would afford us a plausable reason why we should prefer this operation to complete enucleation as a means to prevent sympathetic irritation and sympathetic inflammation, because the cosmetic effect is so infinitely preferable to that of enucleation or even evisceration, to say nothing of the permanent life-time burden and annoyance and expense of the prothesis.

Whether it be from prejudice or bias, or lack of popularity, or for the reason that failures have attended the resection of the branches of the fifth in the orbit, where the operation has been made on unsuitable cases, it is not in the province of this paper to determine, neither is it the purpose of the writer to champion any pet procedure of his own; but simply to call attention to a few points which seem to indicate that the resection of the supra and infra-orbital, and the ciliary connection between the fifth and the globe by the nasal branch, and the branch which supplies the tear gland, may, in suitable cases yield us results which justify us in selecting this simple and easy, and almost harmless procedure under certain condition..

Badal[1] has called attention to the operation of elongation,

[1]Badal. Gaz. Heb. des Sciences Med. de Bordeaux, 3 et 17, Dec. 1881. Annales d'Oculistique, Tome XC., p. 89, etc.

or "*arrachement*" (really tearing out) of the branch which he calls the external nasal, for the treatment of certain forms of ciliary "douleur," which seem to have their origin and point of depart in the globe. He sets aside as manifestly inconsistent, first, all those acute and some chronic forms of complaint, the pathology of which is apparent, such as the different forms of iritis, keratitis, choroido-retinitis, etc., and cites three groups of cases etiologically distinct, which seem to him to offer suitable reasons why this operation should be performed: "First, those painful affections which are purely and simply the expression of a neuralgia of the trigeminal nerve, not accompanied by any appreciable pathological complication in the globe. Second, those which result from certain affections traceable to the tunics of the eye, in particular the ciliary region and the uveal tract, where we have hyperæmia and engorgement, with compression on the filaments of the terminal branches of the nerves not distinctly necrotic or inflammatory in character, yet having a tendency to inhibit normal physiologic metabolism. Third, those painful phenomena which may be recognized as having an origin in some way connected with pressure on the ciliary nerves in the globe where the departure from normal intra-ocular tension is easily made out. Occasionally we note the increased depth of the anterior chamber. Later there may occur a primitive or secondary glaucomatous process arising as a factor or as a sequel to the above, and in many instances which of the two conditions is the true one we cannot always determine." "Everyone," continues this author, "recognizes the vasomotor, secretory, and trophic functions of these orbital nerves in question; every one knows that ciliary forms of neuralgia are almost constantly accompanied by a hypersecretion of the lacrymal gland, by a hyperæmia of the ocular mucosa, by an increased flow of the nasal discharges apart from the tears, and by general trophic disturbances throughout the ophthalmic zone."[2] Chauval proposed to choose the external nasal nerve as the one most appropriate upon which to perform the operation of resection for the purpose of combatting such neuralgias as were accompanied by profuse lacrymation, photophobia and peri-orbital pain. He claimed that this branch

[2]Chauval. Archives General de Medecine, Aug. 1881.

in question not only was most to blame, but that because of its double connection with the tear gland upon the one hand, and the ethmoidal sinus on the other, its "arrachement" would cut off the source of nerve supply to these regions and inhibit algesia; besides it was an operation fairly safe and easy to perform, and conservative in nature, and would always leave the surgeon ample time to undertake any of the more dangerous operations (iridectomy, sclerotomy, paracentesis, etc.) later, in the event it became necessary. Besides it is an operation the anatomy of which is not difficult nor complex. The nasal nerve, after having given off the ciliaries direct and the sensitive root to the ophthalmic ganglion, divides into the internal nasal and the ethmoidal; this is the supply to the anterior nasal and ethmoidal region, while the external is the main part of the nerve as its continuation supplying the conjunctiva, the mucosa of the nasal sac and canal, the palpebral region, etc. The manner in which the main trunk is to be found near its bifurcation, or where it is large enough to serve the purposes indicated, is as follows:

"Place the index finger upon the globe immediately beneath the margin of the orbit, the palmar surface in front, and the extremity of the finger resting against the angle of the nose. The point of emergence of the nerve will be found to be located exactly beneath the center of the margin of the nail."—ABADIE.[3]

The primary incision is to be made with a bistoury, and the dissection finished with blunt hooks or the back of the knife; usually a small plexus of vessels accompany the nerve, which are to be separated and the nerve is to be drawn slowly from the orbit, tearing it away at as great a depth as possible so as to get out the deeper portion and sever the ethmoidal connection as well as the connection with the ganglion.

The supra-orbital is so easily found that one need not to stop to describe the technic of this operation. Usually the writer has simply cut down on the supra-orbital notch and passed a strabismus hook under the orbital aspect and readily found the nerve. When the notch was in the form of a foramen, he has cut out the anterior portion of the notch

[3]Abadie, Arrachement du Nerf Nasal, Annales d'Oculistique, Tome LXXXIX., p. 234.

with bone forceps or a small chisel, and liberated the nerve so as to get out quite a quantity from the corrugator, backwards, and having seized the orbital trunk well in the orbit made steady traction until the nerve stretched considerably before finally breaking deep in the orbit; in this way about two inches in length can be successfully removed. The small wound is dressed antiseptically and closed with one or two small sutures, or may even be sealed up with plaster. At the end of forty-eight hours the union is complete per primam.

In one case operated upon a few months ago the writer found what appeared to be two supra-orbital notches, and two nerves emerging from them, in the same subject on one side, the side affected, while on the opposite side the orbit showed but the one supra-orbital notch. Both of these nerves seemed extremely tender to touch. The patient, a lady, had had severe supra-orbital neuralgia for many months, even years. Both these trunks were attacked, and from an inch and a half to two inches of the nerve trunk withdrawn from each. The part excised had the appearance of nodular irregularities and swellings along the course of the bundles, and from this appearance I concluded that there had been in these nerves more or less neuritis, which probably gave rise to the pain.

My first experience with resection of the supra-orbital nerve may be said to have originated in an accident. Sometimes mere trifles exercise great influences in determining the outcome of a case, and certainly this one was not an exception to that rule. It occurred ten years ago. A lady, Mrs. M——, in somewhat humble circumstances, rather poorly nourished, and afflicted with one of those perennial ophthalmias, had applied to me at the city hospital for relief every year at the beginning of my service for several years. During the three months she was under my care I found that she made some improvement, when she would pass out of my care, and be seen no more until the next season. Sometimes in the intervals she would come to the office with her relapses, and they were all of the same character. The eyes were always fretful, there was much weeping, photophobia, pain, and hyperæmia. The old chronic granular conjunctivitis had run its course for ten years. There was some contraction of the tarsi, and some cicatricial deposit throughout the mucosa

of the lids; the pannus was never very dense; it was more of the thin nebular variety. Astringents usually toned up the conjunctivæ, and good nourishment and indoor life as a rule benefitted her, and with proper attention to her bowels, which were constipated, she would always improve; but as soon as she became sufficiently improved to leave the hospital she would relapse and for the remainder of the year spend her time between the different outdoor clinics, never cured and always suffering.

At the time mentioned I noticed a small round hard elevation of the size of a pea, right above the supra-orbital notch of the right eye. This was extremely sensitive to touch. At first I took it for a small varix; but upon somewhat closer examination, and from the very great sensibility on touch, I came to the conclusion that it was a bead-like enlargement of the nerve-trunk, and it seemed to be long instead of round and extend into the canal. I advised her to have this small tumor removed, not really thinking that it had much to do with the case, but as soon as I came down upon the nerve, which it proved to be, I determined to resect as much of the nerve as I could, and consequently took out nearly two inches of the nerve, which was quite irregular, and had several nodular enlargements throughout its course. The case made an uneventful recovery, healed by first intention, and to my surprise the pain and weeping seemed to have disappeared by magic. She remained in the hospital some weeks after the operation, and left in better shape than at any other previous epoch. In three months afterwards she came to my office, and I scarcely knew her; her eyes seemed to have entirely recovered; the corneæ had cleared completely, and she had no more pain and scarcely any tears. The correction of her astigmatism gave her good vision, and she has remained without any further treatment, quite comfortable, for now ten years.

After that I began to look for such cases, and have made a number of such operations with happy results. This winter I encountered another similar case; one where I had recommended the operation some three years ago, but which was refused. The case had passed out of my memory. She introduced herself by stating that she had come for the purpose of having her orbital nerve removed, as I had recom-

mended. I then recalled the case. Upon examination I found this nerve, which was the right one, excruciatingly tender. The upper eyebrow was drawn up and showed violent contraction (elevation) of the corrugator or rather the frontalis muscle. The side of the face participated in the spasm. She stated that she had had frontal headache and neuralgia for five years, had taken all kinds of medicines; and her physician, who telephoned me, stated that the case was a nuisance to him and had given him endless trouble, and that he had sent her with the hopes that by resecting the supra-orbital nerve she might find relief. Accordingly I sent her to the hospital and operated, keeping her there two weeks. The nerve was easily found. I took out the portion above the notch up to the several divisions and got out from a half inch to an inch of three short branches above the eye, and then cut the bony canal or foramen open with a chisel, made some stripping backwards into the orbit till about two inches of the trunk was exposed, then with blunt forceps made traction until the nerve broke off rather deep in the socket. The case healed nicely, and so far she has had but little trouble. She now says that her eyebrow and forehead on the right side have a sensation of cold, feel numb and chilly all the time, but that she has had no more neuralgia. It would seem that in her case also that a good result had followed the operation.

DISCUSSION.

Dr. Adolf Alt, St. Louis.—While I have had no occasion to make a similar operation for neuralgia, I think a case in which the good primary result of the neurectomy is maintained for ten years is a very fortunate one. I have had occasion to make neurectomy of the supra-orbital nerve, as well as the infra-orbital one, for other reasons, and I have always found that, although I excised pieces of from 1 to $1^1/_2$ inches in length, reunion of the nerve took place after a shorter or longer interval, and with re-establishment of conduction the former symptoms returned, and it was very lucky if they did not assume the severity which had brought abont the operation. In one case of blepharospasmus (see *American Journal of Ophthalmology*, Vol. VI., p. 332) I excised both the supra-orbital and infra-orbital nerve on both sides, and yet

the symptoms returned after a while, though not with the former severity.

Dr. Derrick T. Vail, Cincinnati.—I encountered a case recently which because of its unusual interest I would like to relate. The patient had been suffering great pain in the right supra-orbital region for several years. The attacks were intermittent and irregular. During the attacks the man suffered excruciating pain. There was slight exophthalmos of the right eye. Photophobia, lacrymation and ocular congestion were also present. He belonged to the German type, was stocky in build, sanguine in temperament, with no signs of neurasthenia nor hysteria. I do not think there is any doubt about his suffering agonizing pain. At the periods when he would have these attacks of pain he would develop a suicidal mania and had to be closely watched, as it was feared he would dedestroy his life. Some years ago Dr. Holmes had opened up his right sphenoidal cavity and for two years he enjoyed freedom from attacks of supra-orbital neuralgia. Recently, within the last nine months, he had a recurrence of the most violent character. He came to me requesting that I open up his sphenoidal cavity again. I examined his nose carefully, but failed to find the slightest evidence of sinusitis. The mucous membrane covering the turbinated bones was somewhat boggy; but that was all, and I did not feel justified in curetting, so I simply temporized, using arsenic, aconitine, quinine, leeches and blisters, hoping to relieve the patient without an operation. He went from bad to worse and finally had to have hypodermic injections of morphine to relieve his suffering. Of course I was unwilling to continue the morphine treatment, fearing the habit, and in a day or two was compelled to say that the only thing I could suggest was a resection of the supra-orbital nerve. He readily gave his consent to this. He was anæsthetized and an incision made over the exit of the nerve on a line with the brow and the edge of the orbit. The nerve was readily found. I hooked it up with a tenotomy hook and found that it had divided into some four or five branches before reaching the foramen. Being anxious to get all the branches, I dissected back into the orbit as far as I thought I could safely go, and then grasped the nerve, as the Doctor has described, with a small pair of hemostatic for-

ceps, pulling steadily on it with slow and regular turns. I could feel the nerve stretching more and more, and finally succeeded in tearing it out of the orbit. I then tore out the terminal nerve strands, and as I pulled I could see the skin wrinkling along the course of the nerve as far up as the line of the hair above the forehead. The relief from the acute pain was instantaneous. The healing was by first intention and occupied but five days' time. That was about nine months ago. Three weeks ago he came back to me and said he was troubled again with pain which, while not in the supra-orbital region, seemed to be in the back part of the eye and in the temple. The area around the brow was entirely numb and free from pain. He had an anxious expression, the eye was suffused with tears, and there was a good deal of photophobia. I confess I did not know what to do. He clamored for a nasal operation, but upon examination the nose appeared to be normal, except the membrane had the same sort of boggy appearance previously mentioned. I cocainized the nose, and to get the mucous membrane contracted to the bone used the suprarenal extract, and at the same time removed most of the middle turbinated bones. I went on back toward the cavity of the sphenoid and curetted gently, cleaning it out as best I could. He came back daily for treatment. On the third day he said that something had suddenly burst in his nose. I made an examination and found the upper straits of the nose full of a creamy secretion that came down from the nasal attic. He expressed great relief and seemed to think it unnecessary after that to come for treatment, as he was entirely relieved.

This then was either a case of hysteria, true neuritis, or else of empyema of the sphenoidal cell. I am rather inclined to think it was a case of sphenoiditis. The ophthalmoscopic examination and field of vision were normal, but through these attacks the patient complained a great deal of obscured vision.

Dr. M. F. Coomes, Louisville.—I have been very much interested in the paper just presented, and when I get home I think I shall try this operation on a case. The case is an ideal one for operation — a young lady, 26 years of age, who has suffered similarly to the case described by the Doctor.

When she gives strict attention to her diet she is better, but with inattention to this matter she lapses back again. At the menstrual times she seems to be worse, but I do not think this cuts much figure. I want to thank the Doctor for reading the paper, as it deals with a subject which we do not find in books, and I hope he will keep us posted in the future as to his results in these cases.

Dr. J. O. Stillson, Indianapolis.—As I stated in my paper, I felt that I must be cautious in presenting a paper of this kind before this learned body. I knew I was treading on dangerous ground in offering a paper on the resection of the supra-orbital nerve, because we all know of the old operation which was done away back years ago and left abandoned alongside of the operations for resection of Meckel's ganglion for tic douloureux. I watched this one case for ten years before I felt justified in saying anything about it, and then having run on to these other cases which I treated, I concluded I would write this paper and present the cases for what they were worth.

HYSTERICAL DISORDERS OF THE EYE.

By FRANK A. PHILLIPS, M.D.,

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CHICAGO.

IT is not strange, the functions being—as they are in hysteria—dominated and modified by ideas, that the eye should share in the disturbances produced. Writers on the subject of hysteria are, at the present time, quite universally agreed that the disturbances are psychic in character, beginning in the higher cortical centers, the function of the lower centers of the brain, spinal cord, and of the sympathetic nervous system becoming secondarily involved.

The age, according to Gowers, at which hysteria manifests itself is, in fifty per cent. of the cases, between the years of ten and twenty. It is not strange therefore that its affection of the special sense, sight, is of such frequent occurrence in early life; and this is further accounted for by the fact that when sight is disturbed it is frequently one of the early manfestations of the hysterical affection.

Among the disturbances noted are those of (*a*) sight, (*b*) sensation, (*c*) motion, (*d*) secretion, and (*e*) peculiar associated sensations (*audition colorée*).

(*a*) Concerning sight disturbance we observe that *amaurosis* rarely attains to total blindness, it being usually unilateral and accompanied by amblyopia, more or less marked in degree, of the fellow eye. This is explained by the theory of its being a "crossed amblyopia," the affection involving the center of vision, higher than that for the half field vision, in which the entire field of the eye opposite the hemisphere is fully represented and that of the same side partially. This center is located in the lower and posterior part of the parietal lobe, the supra-marginal and angular convolutions. Of it Ferrier says: "Unilateral destruction of the cortex of the angular gyrus (in the monkey) causes temporary abolition or impairment of sight in the opposite eye, not of hemiopic character." Starr cites the fact of many lesions of the angular gyrus, not involving vision; thirteen such cases recorded by Ferrier and twenty-two by Exner. The few cases observed do not as yet clear up the question completely.

If we may assume a primary inhibition of the activity of the higher centers in the angular gyrus, the "crossed amblyopia" thus produced explains the affection of vision most frequently observed in hysteria and leaves a derangement of the pupillary reflex, etc., to a secondary inhibition of other centers.

Priestly Smith maintains that the condition is due to retinal involvement, but fails to account satisfactorily for the frequent retention of the pupillary reflex.

Max Knies advances the thought that a compression of the optic nerve is brought about by a vaso-motor relaxation in the vascular supply of the tissues at the optic foramen, thus more or less impairing its conductivity.

Gowers acknowledges that there may be pathological susceptibilities common in hysteria to both the center and the retina, but believes the theory of cortical inhibition best explains the phenomena. He calls attention to the obscurity produced by referring the changes to the vaso-motor system, as this explains the condition only by making it dependent upon derangement of the sympathetic system.

Amblyopia is frequently bilateral, often affecting one eye to a more marked degree than its fellow. The visual field is concentrically contracted, the color fields, beside the contraction, often showing transposition or even a total color-blindness.

"Transfert," the transferring of the affection from one side to the other by suggestion, using therefor a magnet or any object supposed to possess intrinsic power, may be demonstrated. The examination at short intervals shows marked changes in visual acuity and the fields of vision. Even a few minutes may be sufficient time to demonstrate either marked contraction or expansion of the field. The suggestion that a plane glass will greatly improve vision is often acted upon immediately. Paræsthesiæ usually confined to one side, and that of the more affected eye, are frequently demonstrable.

When, as frequently occurs, a suspicion of simulation is aroused by the patient's response in answer to confusion tests, these other symptoms of hysteria are of importance from a diagnostic standpoint. In traumatic hysteria, where a legal controversy for damages frequently exists, the difficulty is enhanced, but it is often present when absolutely no cause for simulation can be found. Max Knies calls attention to the value of "other undoubted hysterical symptoms" in such cases.

Prince cites a case of apparent simulation where a case of monocular amblyopia, relieved by resuming binocular vision, incapacitated an applicant for a position requiring normal vision. In summing up his paper he speaks of the "startling results" obtained by confusion tests for simulation, and says "conclusions drawn from such tests are liable to lead to grave error."

Asthenopia (Kopiopia hysterica, Förster) ist hat type of case characterized by extreme tiring of the eyes with exaggeration of painful symptoms. Muscular, refractive, and all discoverable peripheral irritations being sought out and relieved, still these patients frequently continue to find cause for complaint in such symptoms as radiating eye pain or headache with an exhaustion of the retina, evidenced by blurring vision, following slight use of the eye. Central vision is likely to be found normal, but the concentric contraction of the visual field

and color defects are generally present. After using the eyes vision will be found lowered.

Monocular diplopia is unsatisfactorily explained by irregular ciliary contraction. I have carefully examined two cases under the influence of a mydriatic (atropia) and been unable to detect any physical cause to account for the phenomenon; the retinoscope showed no peculiarity in the shadow whatever, and yet its image appeared double in the eye under examination and the correcting lens did not relieve the duplication. I confess an inability to account for the condition except to refer it to an anomalous translation of the stimulus in the disordered higher centers.

Hemianopsia purely functional in character is of rare occurrence. Hallucinations, astigmatism and scotomata are reported.

These disorders of sight are of sudden inception, last indefinite periods, and generally disappear entirely, often suddenly. The fundus shows no change from the normal. The functional loss may become permanent, but in what way the change in structure is brought about is unknown. A question as to the accuracy of the diagnosis naturally arises in such a case, but typically functional cases have been known to be followed by a permanent loss. (Gowers).

(*b*) Disorders of sensation include paræsthesia of all degrees. Anæsthesia or hyperæsthesia of the cornea, conjunctiva, and integument of the lids and temple may be present singly or in a group. The anæsthetic cornea, when irritated, may cause reflex injection of the anterior ciliary and conjunctival vessels and increased secretion of the tears; it is not involved in neuro-paralytic keratitis.

In hyperæsthesia the vision may be increased, but photophobia may be present and vision reduced. Hyperæsthesia of the ciliary body, *i. e.*, "ciliary pains without findings," has already been mentioned under the heading asthenopia.

(*c*) Disorders of motion include both paralysis and spasm. Of paralysis of the *extrinsic* muscles mentioned in literature, I find only abducens paralysis and ptosis. Möbius is quoted as denying hysterical paralysis of eye muscles, and saying that all such cases are traumatic. Others advance the thought that a spasm of the opposing muscle more likely produces the

condition, *i. e.*, apparent abducens paresis, by a spasm of the internal rectus. Spasmodic conditions more frequently prevail. Hysterical blephorospasm is most often bilateral. It appears suddenly and is as suddenly relieved, the attack lasting from hours to even months; pressure points often exist, *i. e.*, points usually in the territory supplied by the trigeminus, upon which pressure at once relieves the blephorospasm. When the lids are simply held quietly closed the resemblance to ptosis is marked, but is diagnosed by the presence of resistance to effort at lifting the lid, the lowering of the eyebrow and the vertical furrows produced by the orbicularis contraction.

Both paresis and paralysis affect the *intrinsic* muscles. Charcot describes a "contracture" of the ciliary muscle in which the remote and near point become fixed at a certain distance from the eyes. This is distinguished from paresis by the absence of any range of accommodation, as will be found in the latter.

The dilator and sphincter iridis are affected, as evidenced by the pupil and its reactions. I have seen in a highly emotional female a marked mydriasis in one eye only in conjunction with a typical functional aphonia. After the latter was relieved the mydriasis recurred at intervals with no subjective disturbance observable. No medicinal or auto-toxic explanation was possible.

(*d*) Of the disorders of secretion epiphora without a cause is of comparatively common occurrence. Chromhidrosis of the lids is quite as rare.

(*e*) Of perversion of associated sensations, both *audition colorée* and "sounding vision" have been observed. As in affections of sight, these varied disturbances are usually found in connection with other hysterical symptoms, but may be the only symptoms present. Their diagnosis from beginning organic disease is not always easy or possible at first examination, but their anomalous course and distribution usually furnish unmistakable signs of their functional character. The prognosis is dependent upon the patient's age, antecedents, physical condition, the degree of hysteria manifested and its duration, and the presence of discoverable peripheral irritation.

A rational treatment takes into consideration all these facts; from the standpoint of the ophthalmologist, treatment must, in a certain degree, be governed by the eye findings, but in no case of a child affected with hysteria should he consider his duty done until he has advised with the parents and the family physician concerning the condition and its management. It is the early treatment or management of these little patients that means much as to whether they are to become self-reliant, useful individuals or unhappy neurotics. Their trouble should not be minimized by classing it as imaginary; yet, on the other hand, the error must not be made of making them a cause for sympathy and commiseration.

I believe that as a rule hysteria as a word in diagnosis should not be used in speaking of such cases to either the patients themselves or the parents; it carries with it to the lay mind a suggestion of "much ado about nothing," of a simulation and deceitfulness. An explanation of the condition as "neurasthenic" or "reflex" is much better received.

In the treatment of hysterical amblyopia in children, hypnotism has been tried and recommended. I have not tried it. It is my rule to inspire them with a "good faith and *strong* imagination."

Suggestive therapeutics has been and will probably remain one of the great powers for good in these cases. An authoritative, positive opinion of good to surely follow a line of treatment means much to these patients. And the more the suggestion can be conveyed in the rules regulating their habits of work, study, and play, the better. Placebos, such as plane spectacles, should be avoided if possible. A placebo remedy may be necessary. It has been my experience to find in all cases of ocular hysteria a refractive error warranting correction. This should be corrected. A muscular defect, proven to be not functional, should be remedied if of sufficient degree by an appropiate operation. Faradism is, of course, to be tried in persistent affections, and is often very beneficial.

Case I.—Amblyopia left, recurring in right eye two weeks later, with central scotoma for red and green, concentrically contracted fields and confusion in naming red and green.

A. B., age 19. A well-developed, healthy looking girl, of quiet appearance but nervous manner of speech. Novem-

ber 19, 1900, complains that about two weeks ago she observed the vision of the left eye to have almost disappeared during the night; since then has been having headache and eye-strain. O.D.V. $^{6}/_{6}$. O.S.V. $^{6}/_{9}$. Pupillary reflexes respond promptly; fundi normal in appearance.

November 22, 1900, having used atropia one per cent. solution as cyclopegic:

O.D.V. $^{6}/_{9} + 0.25 \bigcirc + 0.25$ axis 95. $^{6}/_{6}$.

O.S.V. $^{6}/_{12} + 0.50 \bigcirc + 0.50$ axis 90. $^{6}/_{6}$.

This finding was confirmed by retinoscopy and a correction prescribed for constant wear. The day after obtaining the correction the vision in the right eye was lost also over night. O.D.V. Fingers at three feet. O.S.V. $^{6}/_{6}$. Fundus shows no change.

Examination reveals the presence of exquisitely sensitive hyperæsthesic areas over the right mammary, scapular and hypochondriac regions. She states that in walking or riding, exposed to the wind, induces frequently an attack of "hives" of the extremities—occasionally over the entire body. Globus and flatulence have been present, though not constantly, during the past three weeks.

Three years ago she suffered from "gastritis," lasting six weeks, followed by paralysis of both motion and sensation, lasting a similar length of time. One year ago suffered an attack of paralysis of motion only. The mother states that during both these attacks of paralysis the patient was unable to swallow solid food, feed herself or move in bed. Vision is said to have been lowered with each attack. A stomachic (acid hydrochloric in ess. pepsin) was given with instructions concerning diet, exercise and use of the eyes, and a positive assurance of recovery of the eyesight. Two days later the visual fields (Fig. 1) show white concentrically contracted; red, green and blue are transposed in the right, with a central scotoma for both red and green about 10° in diameter. As the red and green colors approached to within about 10 or 15 degrees of the point of their proper recognition, they were confused, calling red green and vice versa.

In the left eye the color fields are very irregularly contracted.

At this time O.D.V. $^{6}/_{7.5}$. O.S.V. $^{6}/_{5}$.

With such profound hysterical manifestations, one naturally expects relapses, but up to March 20 none had occurred, O.D.V. being $^{6}/_{6}$; O.S.V. $^{6}/_{5}$. She was fearing she would again suffer a loss of vision.

Case II.—Amblyopia binocular; reduced by use of a mydriatic and relieved by suggestion that the correcting lens would restore normal vision.

M. G., school boy, aged 10. Is bright, well nourished, slightly undersized, but very nervous in manner and speech. States that his vision for both distant and near work is very

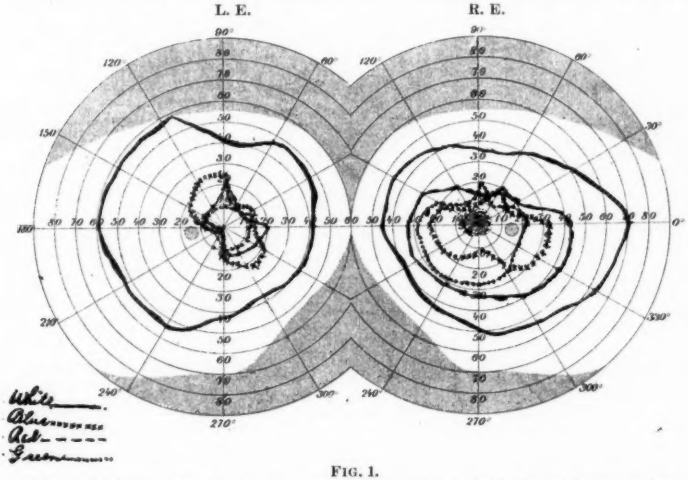

Fig. 1.

Visual fields Case I., showing concentric contraction in fields for white, irregular contraction and transposition in fields for color and central scotoma.

poor, so much so that for the past few days he has been unable to read his lessons at school.

O.D.V. $^{1}/_{45}$; O.S.V. $^{1}/_{45}$; pupillary reactions normal; fundus oculi normal. No improvement in vision could be obtained with any lens. After using a two per cent. solution of homatropin and cocain, O.D.V. $^{6}/_{45}$, + 0.50 sph. giving $^{6}/_{5}$. O.S.V. $^{6}/_{15}$, + 0.50 sph. $^{6}/_{5}$.

Atropia sulph. one per cent. solution was prescribed, and after repeated tests revealed:

O.D.V. $^{6}/_{15}$, + 1.00 sph. $^{6}/_{15}$.

O.S.V. $^{6}/_{15}$, + 1.25 sph. ⌒ + 0.25 cyl. axis 80 $^{6}/_{5}$.

A reduction in the sphere of + 0.50 D. was made for con-

stant wear, and he was positively informed his vision would be restored perfectly. Two weeks later he reported with relief of the amblyopia O.D.V. $^{6}/_{5}$; O.S.V. $^{6}/_{5}$. The visual field (Fig. 2) shows concentric contraction, with a transposition of red and green.

January 19, 1901, returned with O.D.V. $^{6}/_{5}$; O.S.V. $^{6}/_{15}$. The lowered vision in the left eye was not relieved by his correction as worn daily, but was by the same correction in trial frame. I learned that he was reading two or three hours each

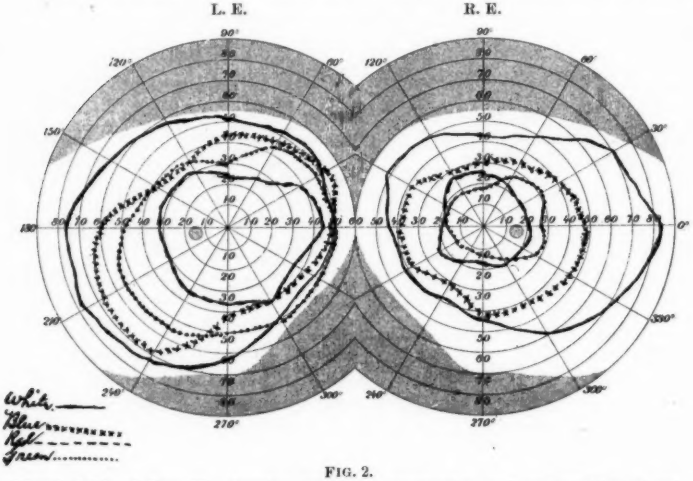

FIG. 2.
Visual fields of Case II., showing concentric contraction and transposition of red and green.

evening, which I asked him to limit to one hour regularly. The visual fields were again taken and again showed contraction and transposition in the color fields. He returned in two weeks with normal vision in each eye.

CASE III.—Binocular amblyopia with monocular diplopia O.D. Visual field contracted and color fields transposed.

October 12, 1900, C. T., school boy, aged 10. Is quiet, slow of speech and very well developed. States that for past four weeks vision has been very low in right eye with slight frontal headaches. Right eye more recently affected and at the present time he cannot see to read his work, either near or distant, at school. He complains also of a diplopia, which persists on closing the left eye, but disappears on closng the right eye.

The visual fields (Fig. 3) are concentrically contracted and show a transposition of red and blue, very irregularly outlined in the left eye.

A very careful physical examination and urinalysis was made by the family physician, Dr. W. F. Stokes, who reported negative findings, aside from the eye disturbance.

Atropia one per cent. solution was prescribed as cyclopegic and repeated tests made covering a period of ten days, the final test showing:

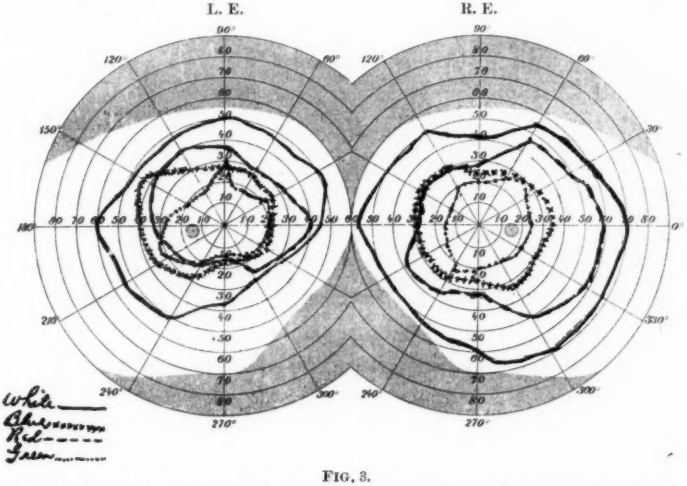

FIG. 3.
Visual fields of Case III., showing concentric contraction and transposition of red and blue.

O.D.V. $^{6}/_{60}$, + 2.00 sph. $^{6}/_{9}$.
O.S.V. $^{6}/_{60}$, + 2.00 ⌒ + 0.50 cyl. axis 75 $^{6}/_{7}$.

This correction was demonstrated by the retinoscope at the first test under the cyclopegic, but the improvement in vision was gradual, each succeeding test showing improved vision. No explanation was afforded for the monocular diplopia by any finding in the refractive media or fundus.

A correction was prescribed. Four weeks later he returned with O.D.V. $^{6}/_{6}$; O.S.V. $^{6}/_{6}$. The diplopia has been relieved. He is attending school at the present time and has had no relapse of his eye trouble.

CASE IV.—Hysterical asthenopia, "ciliary pains without findings" with emotional hysterical attacks.

B. C., aged 21, a dressmaker by occupation, September 14, 1899, complains of headache, both frontal and occipital in character. Is unmarried, well nourished and extremely nervous. The headaches are radiating in character and not accompanied by any general disturbance; lids dry and burning sensation.

O.D.V. $^{6}/_{5}$ manifest + 0.50 cyl. axis 80 $^{6}/_{5}$.

O.S.V. $^{6}/_{12}$ " + 1.00 " " 90 $^{6}/_{5}$.

Under atropia O.D.V. $^{6}/_{15}$, + 0.75 sph. + 0.63 cyl. axis 80 $^{6}/_{5}$.

O.S.V. $^{6}/_{30}$, + 0.50 sph. + 1.00 cyl. axis 97. 5-$^{6}/_{5}$.

No muscular imbalance of any kind was demonstrable; with the correction given vision of $^{6}/_{5}$ was obtainable, but after a period of about six weeks the patient returned time and again complaining of the radiating pain. The refraction was again carefully reviewed and finding confirmed. A weaker cylinder and both stronger and weaker spherical corrections were tried, but all expedients were fruitless. I learned from the family physician, from whom I had the case, that he had been called to see her in repeated hysterical attacks, emotional in character, and that there were no evidences of organic disease of any kind to be found. Fourteen months after first seeing her the exaggerated headache was still present and all attempts negative in eliciting any cause therefor.

The next oculist she consulted may have made a "marvelous cure" by having gained that personal control or grasp of the patient's condition to allow of a firm suggestion being made and received; but it is my experience, where hysteria is well developed, patients are not so amenable to a suggestive measure of relief—such, for instance, as a correction for their peripheral irritation produced by the refractive error. It is true that the irritative symptoms produced by the refractive error are relieved, but so fixed have become the exaggerated symptoms that they remain after the removal of the primary cause.

Case V.—Hysterical "contracture" (paresis?) of the ciliary muscle without amblyopia, with hysterogenetic spots, painful joints and transposition in the color fields.

March 25, 1899. H. F., school girl, aged 10; well nourished and normal development. Complains of inability to see

distinctly at near point during past three weeks. Pupillary reflex normal; slight photophobia; lamp light has a branched or blurred appearance. For past three months has complained of blurring vision, for short periods only, with headaches gradually increasing in frequency.

Fundus oculi of normal appearance. No ciliary injection; no history of any sore throat or illness of any kind during past year.

O.D.V. $^{6}/_{7.5} = 0.50$ sph. $^{6}/_{6}$.

O.S.V. $^{6}/_{6}$.

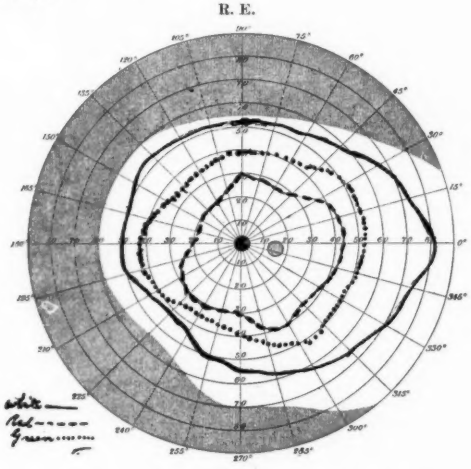

FIG. 4.
Visual fields of Case V., showing transposition of red and green in R. eye.

By placing before each eye a 2.50 D. sph. the patient is enabled to read easily small type at near point. Without them only very large type can be read.

Areas of hyperæsthesia are demonstrable on the right side, involving the mammary, scapular and hypochondriac region, also the right knee and ankle; the latter are quite as sensitive to light as firm pressure and not swollen or discolored. Temperature normal. The visual field (Fig. 4) shows concentric contraction, with complete contraction of red and green. Unfortunately the field for the left eye has been misplaced and cannot be reproduced. Hypermetropia was shown by the ophthalmoscope, and atropine was prescribed, after three days' use of which, examination shows:

O.D.V. + 1.75 sph. ⌒ + 0.25 cyl. axis 180 $^{6}/_{5}$.

O.S.V. + 2.00 sph. $^{6}/_{5}$.

The retinoscope revealed the astigmatism at 180 in right eye.

Two weeks later reported reading both near and distant type with the correction given. I am unable to learn if there has been a return of the trouble, as the family has moved and I cannot learn their present address. My record does not show the exact range of accommodation with the + 2.50 sphere before use of the atropia, and I am therefore unable to eliminate the possibility of the case having been one of

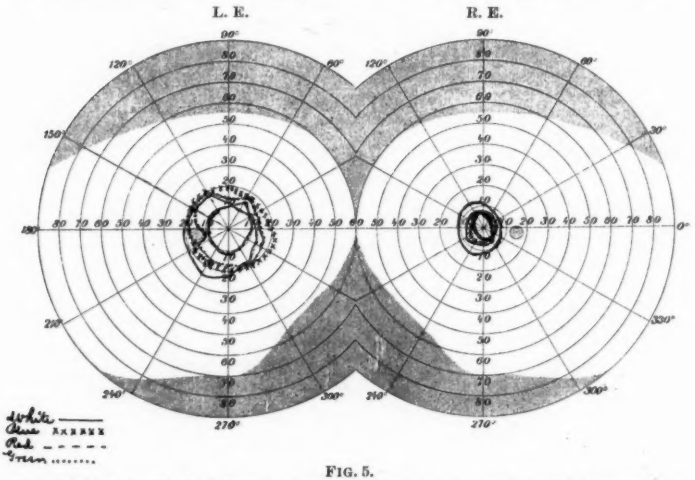

FIG. 5.
Visual fields Case VI; high degree of concentric contraction and partial transposition in color fields.

paresis of the ciliary muscle, but owing to the hypermetropia revealed by the cyclopegic, which was not discovered in the manifest reading, I am inclined to view the case as one of "contracture."

CASE VI.—Hysterical amblyopia, with recurring monocular diplopia and markedly contracted visual fields.

May 9, 1898. L. L., female, aged 14. A refractive error was corrected. O.D.V. $^{6}/_{15}$. O.S.V. $^{6}/_{12}$. Correction under atropia, giving O.D. and O.S.V. $^{6}/_{9}$. There was present a strabismus divergens, for which operative relief was refused. Six months later returned with a binocular amblyopia

not relieved by her correction. In the summer of 1899 the amblyopia was still present, with but short periods of relief. The O.D.V. was reduced to $^{1}/_{60}$; O.S.V. $^{3}/_{60}$. She complains of much asthenopia on attempts at using the eye for close work. The monocular diplopia of the right eye present lasted about six weeks. The visual fields (Fig. 5) are markedly contracted. It will be observed that the fields for color overlap in many places. After finishing the examination a second field (Fig. 6) of the left eye was taken, which shows increased restriction, indicating the retinal exhaustion so frequently present in these cases.

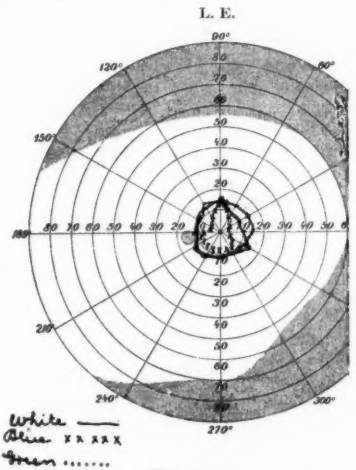

FIG. 6.
Visual fields of L. E., Case VI., shows the contraction following use of the eye, being taken ½ hour after field shown in Fig. 5.

During the summer of 1900 the patient consented to a tenotomy for the relief of the divergence. Both external recti muscles were tenotomized and parallelism obtained. Shortly after this diplopia appeared, which, on examination, was shown to be again monocular, this time involving the left eye. The false image, slightly hazy, was always symmetrically placed to the left and slightly above the true. Under a mydriatic no cause for the diplopia was discovered. During 1900 the amblyopia was accompanied by a photophobia, rendering ophthalmoscopy almost impossible at times. The fundus has shown at no time any active changes; a small

atrophic, pigmented, choroidal spot was observed in the nasal side of the right fundus, which has remained unchanged during the two and a half years she has been under observation. A variety of convulsive seizures, answering a description of hysteria, have been present for about three years; typical globus and gastric distress have frequently been present.

April 4, 1901, I last saw the patient. No photophobia was present; the eye grounds remain as at previous examination; O.D.V. and O.S.V. $^{6}/_{45}$ with the correction; by placing indifferent lenses, such as plane, 0.12 + and —, in succession before the eye, suggesting improvement with each, a vision of O.D. and O.S. $^{6}/_{9}$ was obtained. I had hoped by the suggestive influence of the operative procedure to permanently relieve the amblyopia, but the relief obtained was only temporary. The home rule of this patient is bad. She is exceedingly willful and the mother says she is unable to control her in any way. A change of home surroundings would, I think, prove beneficial.

Case VII.—Hysterical asthenopia; concentric contraction, transposition in color field and a scotoma in field for white only; partial ptosis.

H. H., 34, female, unmarried, in good general health. Complains of headache, frontal and occipital in type, aggravated by close work or reading. Has a partial ptosis, overcome at times by great effort. Occasionally complains of extreme blurring of distant vision. During the past year has lost a near relative and an unusual grief has been exhibited. Emotional hysterical attacks reported by the family physician. Pupillary reflexes are normal; slight photophobia present. Ophthalmoscope reveals normal eye grounds. O.D.V. $^{6}/_{6}$, reads very hesitatingly; after testing a few minutes, cannot read better than $^{6}/_{7.5}$. O.D.V. $^{6}/_{9}$. Similar blurring on use of the eye, vision then being $^{6}/_{12}$. No improvement with the lens. The ophthalmometer shows O.D. 1, axis 180. O.S. $^{3}/_{4}$, axis 30. Visual field taken with following results (Fig. 7): O.D field for white, slight contraction; blue, red and green contracted and transposed. O.S. contraction with scotoma for white in the temporal field outside the field for color. Color transposed and irregularly contracted. Under mydriatic (homatropin and cocain used both December 28 and 29) examination shows:

O.D.V. $^{6}/_{7.5}$, + 0.25 sph. ⌒ + 0.25 cyl. axis 10 $^{6}/_{6}$.
O.S.V. $^{6}/_{18}$, + 0.50 sph. ⌒ + 1.00 cyl. axis 165 $^{6}/_{5}$.

At the end of one week returned with much improvement. The headaches were decidedly benefitted; the visual fields were not so restricted, the scotoma had disappeared. At the present time I learn that the improvement continues. I report this case as a contrast to the continuance of the exaggeration symptoms shown in case number four. In other particulars they were very similar.

In conclusion, I wish to call attention to the following facts:

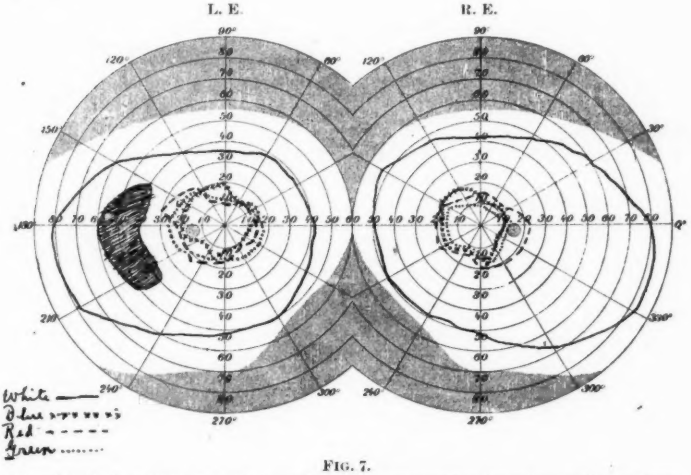

FIG. 7.
Visual fields Case VII., concentric contraction, transposition for colors and a scotoma for white in L. E. only.

In six of the cases the visual fields show contraction with transposition in the color fields. In one only is shown a central scotoma for red and green confined to but one eye. In one case a scotoma for white only.

The ages of the patients range from ten to thirty-four years; but two are males.

The cases comprise two of asthenopia, one of contracture of the ciliary muscle, and four of amblyopia; of these latter two were attended with monocular diplopia. In one only were other symptoms of hysteria absent.

In two cases improvement has been only temporary; one

final result unknown; four under observation, relieved from the active manifestations.

Errors in the refractive index were present in all the cases. That this had any determining influence in localizing the affection in the eye I am not certain, but believe such is frequently the case, the irritation incident to the eye strain being sufficient to act as the exciting cause.

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DISCUSSION.

Dr. S. C. Ayres, Cincinnati, O.—I have had quite a number of these cases. The Doctor spoke in his paper about the sudden disappearance of the amblyopia. I remember two cases of this kind occurring in two young ladies. In one of them before making the ordinary tests I found one eye very amblyopic and the other normal. I used a mydriatic and to my surprise found both eyes normal. In the other young lady there was a history of amblyopia from childhood, and to my great surprise in this case this condition disappeared under the influence of a mydriatic. I have found these disturbances occurring in young ladies with some menstrual trouble or who were under some mental excitement. I recall a lady whom I examined for some error of refraction, myopic astigmatism. In a few days after I had fitted her with glasses she told me she could not wear them at all. She came to the office and with the test glasses I found her central vision perfect, but her field of vision concentrically contracted to about 10 deg. She had some uterine trouble, was operated upon for it and the difficulty disappeared. I recall another case in a young lady whom I treated for some corneal trouble. She had keratitis and got well. It was a prolonged case, but she

went home after a while, coming back later on, stating that her trouble had returned. I examined her and there was not a sign of trouble on the cornea. Her grandfather (who was a physician) was with her, and I explained the situation to him. She had some menstrual trouble. I said to her: "You are going to get well quickly, but I shall have to hurt you a little." I picked up a strong speculum and put it into the eye and allowed it to open as widely as it would and kept it there as long as I felt like punishing her—a few minutes only. The next morning I repeated this treatment and she said she was very much better, and on the following morning she said she was perfectly well. I gave her two treatments and completely relieved her. These troubles are either hysterical due to inhibition, or some reflex cause—a question which I will not settle.

Dr. Dudley S. Reynolds, Louisville, Ky.—I have seen a number of cases of reflex disturbances in the eyes, and my experiences have been somewhat similar to those of the last speaker, but I have never tried the speculum, I think it misleading for us to conclude with the essayist that contractures of the ciliary muscle are indicated by a merely manifest, or apparent fixation of both eyes for any distance. In other words, absence of the power of accommodation, either with or without ambloypia, is not sufficient within itself to indicate disease of the ciliary muscle. I have seen a great many cases of this kind relieved promptly by general medication, especially in miasmatic conditions. I would like to suggest that the ciliary muscle is made up of two sets of fibers, and when we speak of contractures we mean a permanent condition of contraction in the muscles due to organic change of structure. This necessarily means that the nutrition of the structure is impaired, and nothing can overcome this structural change in the muscles. With the ciliary muscle in a state of permanent contraction, no test of refraction would be possible. I feel sure such conditions could not belong to the domain of hysteria, or any of those reflex neuroses found most frequently in women, and at times in men. There are, however, frequently observed conditions of spasm of accommodation, in which amblyopia seems to exist, in which a mydriatic affords relief from the pain, and discloses the error of refraction which caused it.

I had a very remarkable case of this sort of trouble in a young man, who gave up a position in the railway service because of increasing amblyopia, which disabled him from reading the coarsest type. Searching examination disclosed hyperopic astigmatism. The correction of this condition relieved him entirely.

Another instance I wish to relate is that of a young lady, aged 19 years, who had graduated from a first-class academy, and who came to see me about her eyes. She had been subjected to prolonged mental strain in her school work, after which she came home and entered society, lost a good deal of rest, and suddenly discovered she was blind. An examination showed pale, mottled, œdematous disc, with sight = $^{6}/_{60}$ Snellen. A note to the family physician brought out the fact that she was subject to chronic constipation, and had disease of the rectum, relief from which removed all the eye symptoms. She had no error of refraction. Although unable to read any print when I first saw her, her acuity of vision was perfect as soon as the intestinal trouble was removed. After this she had no use for the glasses which she had been wearing at the suggestion of a confrère.

Discussion by Dr.——(Name not known.)—These cases of course are quite commonly seen, some phases being more commonly met with than others, especially amblyopia. I had one case which was of particular interest to me because of the manner in which the extra-ocular muscles of the eye were affected. I looked up the literature pretty carefully but could find nothing reported of a similar nature to my case. I presume, however, all of these cases vary in details very much, according to the individual. The patient was a woman who was brought into my office as being perfectly blind; she said she could see nothing, could distinguish between light and dark, but when I attempted to have her count fingers, she could not count them at all. She gave a history of having had this trouble come on her suddenly four or five days before seeing me. She said she was taking a nap in the afternoon, and when she awoke she found she could not see, and this had persisted. The peculiar feature in connection with the case was the manner in which the extra-ocular muscles were affected. By the use of suggestion I could get her to look at

the letters and finally to read $^{20}/_{20}$, but I could not get her to control the movements of the eyes. In telling her to look up one eye turned up markedly and the other turned down. In telling her to look to the right one eye turned toward the right, the other remained stationary, or deviated a little to the left. By covering one eye and telling her to follow the finger with the other eye the motion was found perfect in all directions for both eyes. All through the time of her examination this particular condition persisted. She was referred to me by a physician with the idea that there was something very serious the matter. I cured her and the physician refused to report any further in the case.

Dr. W. L. Dayton, Lincoln, Neb.—I believe that the idea that the doctor has brought out in his paper of doing away with the name of hysteria in conversing with our patients or their friends, the doing away of this nomenclature, is the proper thing. I believe that we should guard against this the same as we would in telling patients that they have an incipient cataract, that they may or will become blind, for we have all had cases of incipient cataract, which we have diagnosed, and which have remained in statu quo and never advanced. Again, the laity have in their minds the fact that hysteria is nothing, and to our shame it may be said that the physician laughs at it, and says when the subject is brought up: "Oh, that is nothing." Of course it is becoming more and more the case that the better class of physicians realize the fact that hysteria is a condition due to some morbid state of the human being, and for that reason I most gladly acquiesce in the doctor's recommendation that we dispense with the name hysteria in conversing with the patient or the family.

We have all had cases such as have been brought before us to-day, and many are the ways and means which we have adopted to cure them. I have found that suggestion answers well in some cases. Hypnotism I have also tried. In some of these cases I have found that a slight error of refraction was at the bottom of the trouble. In one instance a young lady of 16 years was referred to me by the principal of one of our schools. He said she was of no account in school and could not see at all. After a most thorough examination I

found nothing wrong. While she could not see $^{22}/_{200}$ without glasses, yet she could see $^{20}/_{20}$ with plain lenses. We resorted to all manners of schemes and tests to relieve this condition, and at the same time assured her that all would be well. The girl for six or eight weeks has been wearing glasses, which are very weak; perhaps there is $^{1}/_{2}$ dioptry of astigmatism and are slightly off from the regular angle of meridian; just what I do not now remember. She has, however, been wearing the glasses and attending to her school duties ever since with no further trouble. Of course we have very many cases, from amblyopia to affections of the extrinsic muscles.

Dr. F. A. Phillips, Chicago.—In conclusion I will make a very few remarks. I tried in my essay to make clear what was meant by peripheral irritation; by this I do not mean an irritation which is confined to the eye, as it may be systemic, the influence of constipation, uterine disease, etc. All of these causes must be looked into, and many of these cases of hysteria can be relieved by attention to these irritations. I do not know what the exact cause of the change in the vision is. We cannot explain that. The speculum treatment mentioned by Dr. Ayres, to my mind, is one means of applying suggestion—a suggestive therapeutic measure. In reference to contracture of the ciliary muscle, I do not mean to imply thereby any structural change in the ciliary muscle, but a purely functional condition. Charcot has described such a condition of the ciliary muscle which he called "contracture," and it is to this that I refer. I will refer to Case V. of my series here reported as showing that no such structural changes were referred to. Regarding refractive asthenopia, we all of us in our refractive work meet with many of these cases, but we do not find such fields of vision as I have here outlined. I have taken the visual field in many of these cases as a means of proving to myself whether they were due to merely reflex cause or were hysterical in their origin: and the visual fields have invariably shown none of the concentric contraction or transposition in the color fields so characteristic of hysteria. By the term asthenopia, as used in my essay, I do not mean that variety, therefore, that is associated with refractive errors or muscle defects only, but in which characteristic hysterical symptoms are also present.

A CONTRIBUTION TO OUR KNOWLEDGE OF CORTICAL BLINDNESS.—TWO CASES OF BILATERAL HOMONYMOUS HEMIANOPSIA.

By DR. C. BARCK,

ST. LOUIS.

SINCE the first communication by Hitzig, in 1875, on a centre of vision in the posterior part of the cerebrum, this question has been zealously studied by comparative anatomists, physiologists, pathologists and oculists. To their combined efforts we owe it that the question in the main can now be considered as solved, whilst on some points there is still considerable controversy. The primary optic centers (nuclear centers) are:

1. The external geniculate bodies.
2. The pulvinar.
3. The anterior quadrigeminal bodies.

In the first one of these about 80 per cent. of the fibers of the optic nerve end, and therefore it must be regarded as the most important nucleus. The corpora quadrigemina are entered by the fibres for the pupillary reflex only; at least this is the generally adopted opinion, based upon experiments as well as pathological findings.

From the primary centers the fibres pass caudad under the name of optic radiation and reach the convolutions of the occipital lobe. The exact extent of the occipital cortex, which must be destroyed in order to cause complete hemianopsia, is not yet fully known. According to Munk, in the ape the entire occipital lobe up to the fissura occipito-parietalis is the center of vision. In man the same conclusion seems to be justified, as in different instances different parts of the occipital lobe have been found affected; but invariably the convolutions around the calcarine fissure were implicated, and according to Henschen's analysis this is the most important part of the visual area. The question which is not yet solved, and no doubt a very interesting one, is the central area corresponding to the macula lutea. The opinion of Munk, that in the ape the macula lutea is represented in the

convolutions of the opposite occipital lobe, which are turned towards the sulcus longitudinalis, can not be accepted for the human brain. The clinical experiences speak irrevocably against it. They are:

1. That in unilateral hemianopsia the central vision is always preserved, no matter if the hemianopsia is right or left-sided.

2. That also in bi-lateral hemianopsia, due to succeeding lesions in both cortical centers, a small area around the point of fixation is preserved, with sometimes remarkably good central vision.

Of such cases of double-sided hemianopsia there have been reported in literature up to 1896 27 instances, which were collected by Kastermann (*Monatschrift für Psychiatrie und*

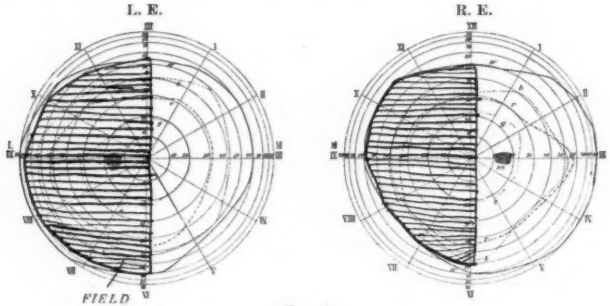

FIG. 1.

Neurologie, November, 1897.) Since about half a dozen more were published. I have seen the following two in my practice:

CASE I.—H. R., 59 years old; was first seen in September, 1889. A few days prior to his consultation he awoke with a severe headache and had more or less pain in the head ever since. Furthermore, he noticed some disturbance of vision. No alteration of sensorium, no paralysis or paresis.

The examination of the eyes revealed nothing abnormal objectively; fundi normal. Subjectively there was a typical complete, right homonymous hemianopsia. The boundary between the blind and seeing portions of the fields was running perpendicular about $1^1/_2^\circ$ to the right of the center. Outlines of the remaining half of the field normal. (See Fig. 1.)

I diagnosed an affection of the left occipital lobe, probably due to thrombosis of the arteria cerebri posterior. I saw the case a few times shortly hereafter, and then once nearly a year afterwards. The field of vision remained the same. The central vision, which was at the first examination $^6/_{18}$ in the right and $^6/_{24}$ in the left eye, had improved to nearly $^6/_{12}$ in each. He could read large type. The patient was brought to me again in March, 1894. He was nearly blind and had to be guided. Fundi normal. The fields were reduced to a small area around the point of fixation, about $2^1/_2^\circ$ wide and $^3/_4^\circ$ high. (See Fig. 2.) I found the central vision better than I expected—$^6/_{50}$ and $^6/_{60}$ respectively. But he was not able to orientate himself, either on the street or even in his own room. He had lost the memory for places. This want of

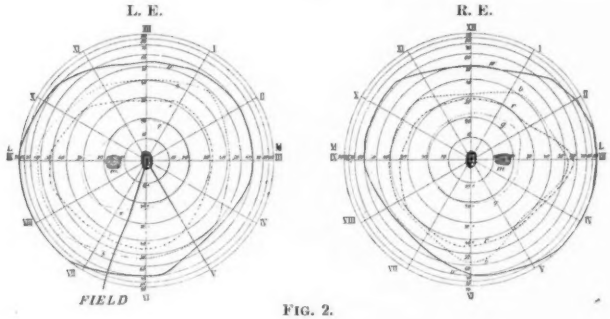

FIG. 2.

orientation and memory for places in spite of the persisting central vision is one of the symptoms of Munk's so-called "Seelen-blindheit," mental blindness, and is in all probability due to an interruption of the visual associate fibres between the cortex of the occipital lobe and the other centers of the cerebrum, center of speech, etc. The diagnosis could only be that of destruction of the right occipital lobe, including the mentioned tracts.

Also this time there were no complications, the mental functions not considerably affected, so that the clinical picture was quite a clear and precise one. I saw the gentlemen at intervals about three or four times afterwards. The field of vision did not change materially, whilst the central vision improved considerably. At the last visit, in October, 1896, he

was able to read large type. The color perception was impaired, but not altogether lost. His main complaint was still his difficulty in orientation. He died a few months afterwards, and unhappily I was not able to secure a post-mortem.

Case II.—Wm. B., age 57; was first seen on the 21st of June, 1898. The history which could be obtained was not very clear. He had a stroke of apoplexy about three-quarters of a year previously, which caused a nearly complete paralysis of the left arm and leg. At the same time his vision became affected in a manner which he could not describe any more closely. The eyes were not examined at that time; for the palsy he was under treatment of his family physician. This improved slowly and at the same ratio as his sight, till a week ago. Since then he complained of headaches and noticed a

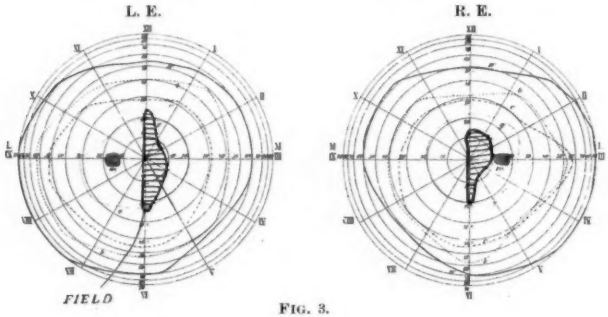

Fig. 3.

considerable decline of vision, which prompted a consultation.

I found the external appearance of the eyes and the fundi normal. V. R.=$^1/_{60}$, V. S.=fingers at 1 meter. The visual fields showed a complete left and a partial right hemianopsia. The boundary line to the left was running perpendicular about 1° to the left of the point of fixation. In the right half there was an area left which extended 10° to 15° horizontally at the widest part and 35° to 40° vertically. Fig. 3 represents more closely. The color perception was good. Besides the paresis on the left arm and leg there was a weakness of memory and generally a slow cerebration. Orientation was not materially affected.

I arrived at the diagnosis of bilateral homonymous hemianopsia; that at the time of the apoplexy the right occipital lobe was implicated, causing a typical and complete left

hemianopsia, and that shortly before his visit the left occipital lobe became affected, causing an incomplete right hemianopsia.

The patient improved slowly in every regard. The next time I saw him was on the 17th of November, 1898. The central vision had increased to $^{6}/_{30}$ in the right and $^{6}/_{24}$ in the left eye. He was able to read Snellen VII. with the proper correction (+ 4.0). The left half of the field unaltered, the seeing area of the right increased (See Fig. 4.)

He visited afterwards some sanitaria, and I did not see him till February, 1900. His general condition had continued to improve, and so had the sight. It was $^{6}/_{10}$ in each eye; could read Sn. III. and even II. with difficulty. The field of the right half was again enlarged, that of the left remain-

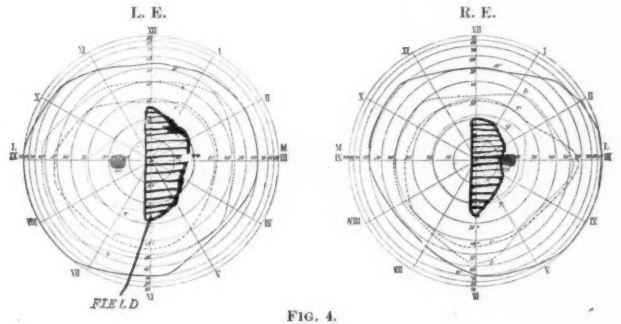

FIG. 4.

ing blind. At his last visit, end of 1900, the findings were the same. The conclusion we must arrive at is that the lesion of the right occipital lobe is irreparable, whilst that of the left was of a milder character, amenable to improvement.

Of the mentioned number of reported cases of bilateral hemianopsia, we possess five post-mortem examinations. Of these in two (of Schmidt-Rimpler and Peters) symptoms and the lesions found were so complicated and manifold that they are hardly available for the solution of the question which interests us. Only the remaining three presented an uncomplicated and clear picture, and are therefore of high value.

As some of these original communications are not easily accessible I take the liberty to quote them briefly:

1. Case of Forster and Sachs (clinical picture in *Arch.*

für Ophthalmology, Vol. 36, 1890. Post-mortem in *Arbeiten aus der Psychiatrischen Klinik in Breslau*, 1895.) Man of 44. In November, 1884, sudden and complete right hemianopsia. Vision ⅓; rose nearly to the norm within the next month, so that the patient could resume his occupation. In August, 1899, left hemianopsia developed within a few days. Only a small central part of the field remained, extending 1° to the right, 3° to the left, ½° upward and 2½° downward from the point of fixation. Central vision at first ⅓, rose afterwards to ½. Color perception entirely lost. Orientation also entirely lost, whilst patient was able to read and write. Exitus in 1893.

The post-mortem showed in both hemispheres, quite symmetrically, a large defect on the mesial surface of each occip-

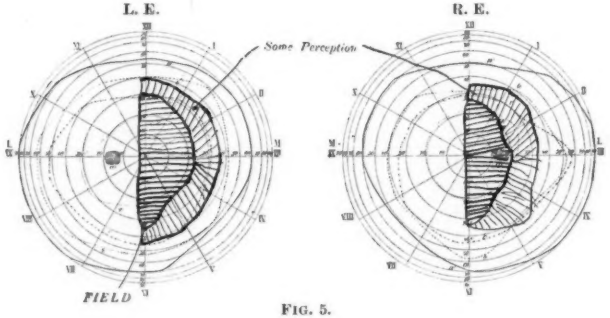

FIG. 5.

ital lobe. It implicated also a large portion of the convex surface. The microscopical examination revealed that of every occipital lobe all the medullary layers mesially and below the ventricle were destroyed. Only a small anterior particle of the cuneus and the hindermost portion of the fissura calcarina were apparently left intact.

2. Case of Kaestermann (loco citato), 1896. First right hemianopsia. Three years afterwards left hemianopsia, with the exception of a peripheral zone in left half of field. Color perception lost; want of orientation; mental blindness.

Post-mortem showed both occipital lobes destroyed by softening. Only in the area of the fissura calcarina there were two symmetrically located places, at the floor of each fissura close to the edge of the occipital lobes, which had remained intact.

3. Case of Laqueur (*Bericht der Opthal. Gesel.*, Heidelberg, 1898). Patient, 62 years old; was suffering since 14 years from chronic nephritis and arteriosclerosis. On June 15, 1897, accompanied by severe headache, a complete hemianopsia developed. On 29th of July he became suddenly entirely blind. Examination by Prof. L. two months after the last attack. V.R. = $^2/_5$, V.L. = $^5/_9$ The field of vision measures $1^1/_2°$ in the horizontal and $2\text{-}2^1/_2°$ in the vertical direction. Orientation and sense of locality gone. Within the next year no change of field, but improvement of central vision, so that he could finally read Yaeger No. 1. Exitus on on the 6th July, 1898.

Post-mortem by Recklinghausen. The basal blood vessels of the brain show atheromatous degeneration. On the left hemisphere there is a place in the second branch of the arteria cerebri posterior $^4/_5$ mm. long where the blood vessel does not collapse, and does not contain blood. Introduction of probes from both sides proves that here the lumen is firmly closed to the extent of 10 mm. The continuations of the obliterated artery are open and contain blood. On the basis of the right hemisphere, in spite of careful searching, no obliteration of the artery could be detected.

The most prominent microscopical changes of the cerebrum were found on the mesial and lower surface of the two hemispheres. In the left hemisphere the entire cuneus, the gyrus lingualis and gyrus fusiformis were totally sunken and softened. Forward the softening reaches to the branching of the art. prof. cerebri. The two inner convolutions of the lower surface are entirely destroyed.

In the right hemisphere the cuneus is softened, but not fully destroyed. A considerable portion of its upper convolution against the convexity is left intact. Downward the softening extends into the posterior portion of the gyrus lingualis up to $^1/_2$ cm. from the edge of the occipital lobe. Forward it extends along the fissura calcarina also to the branching of the art. prof. cerebri.

All the other parts of the brain were found normal.

Prior to our knowledge of bi-lateral hemianopsia (commencing in 1890) the explanation for the preservation of central vision in unilateral hemianopsia was that the macula lutea region was provided for by both occipital lobes, and

that after destruction of one the other assumed the function. The main supporters of this theory were Gowers, Knies and Wilbrand. It is no doubt insufficient to explain the remaining central vision in bilateral hemianopsia.

Forster drew from the findings in his case the conclusion that the macula lutea was represented in the convolutions around the posterior portion of the fissura calcarina. Kaestermann's case would support this opinion. Henschen, on the other side, arrives at the opposite conclusion, that the convolutions around the anterior portion of the fissura calcarina represent the macula. Laqueur's case would speak for this opinion.

Evidently no conclusion can be drawn from a few cases, and the solution of this problem must be left to the future. Monak (on brain diseases in Nothnagel), after a careful revision of all the known cases, ventures to express the following idea:

1. That the macula is especially richly represented in the external geniculate bodies.

2. That it is represented at no special portion, but by the entire cortex of the occipital lobe.

DISCUSSION.

Dr. W. O. Stillson, Indianapolis.—I will not take much time in the discussion of this paper, because it would take a whole afternoon to do it justice; but I commend Dr. Barck and thank him for the paper, which was very interesting to me and to every one interested in ophthalmology. It was worth a trip here to hear this paper. I have had a good deal of trouble in locating these lesions, and the doctor's paper has made it plain. This is of interest to the neurologist as well as the ophthalmologist. I thank him greatly.

Dr. W. L. Dayton, Lincoln, Neb.—I would also thank Dr. Barck for this paper, and I hope we may see it in print early that we may digest it carefully. I am very much interested, inasmuch as I have a case of a distinguished gentleman, who has been colonel of the regiment which Bryan raised; he has been exposed to the climate of Colombo. He is a man of wonderful physique. When he was first attacked I think he was in bed suffering from an attack of catarrhal fever; there was homonymous hemianopsia.

HYALINE DEGENERATION OF THE CORNEA. WITH REPORT OF THREE CASES.

By OSCAR DODD, M.D.,

Surgeon (Eye Department) Illinois Charitable Eye and Ear Infirmary; Oculist and Aurist at the Augustana and St. Joseph's Hospitals.

CHICAGO.

THE hyaline is said to be the most common form of degeneration of the cornea, being one of the products of a transformation of the albuminoids due to defective nutrition. It may affect the epithelium alone or the substantia propria of the cornea as well. The degeneration is accompanied by an infiltration of fine dots, granules or larger globules of a highly refracting material, differing from amyloid or colloid in their reaction to certain stains.

As examples of the clinical conditions in which it occurs, arcus senilis is the most common form affecting the corneal tissue proper. The epithelium may be affected alone, as in bullous and filamentous keratitis, where the changes take place rapidly and the degenerated tissue is exfoliated. A much more chronic condition is that known as "Band-Shaped Keratitis," "Transverse Films of the Cornea," and by various other names, where the degeneration takes place both in the epithelium and the deeper tissues, and is followed by a deposit of lime salts.

The three cases which I shall report belong to this chronic form but differ clinically very much from most of the cases reported. The first case was one with a marked hyperplasia of the epithelium, probably associated with a hyaline deposit.

Mr. P., aged 65 years, came to my office in October, 1898. He was a master mechanic of one of the large railroads, and his work required considerable application as well as exposure. He had noticed a small growth on his right eye for ten or fifteen years, probably a pinguecula. In December, 1895, his eye began to give trouble, and in April, 1896, he had a pterygium removed by the local physician. In June, 1896, he consulted the late Dr. Tilley, who operated and later cauterized it with medicines several different times at intervals of some weeks apart. When I first saw him the eye had gone

some time without treatment, and recently it had become so irritable he could not use the other eye for his work.

The palpebral conjunctiva was practically normal. The eyeball was very much congested, a great many vessels running up to the cornea. On the cornea were two thick whitish masses, one on the nasal, the other on the temporal side, covering about two-fifths of the whole surface. Between the masses and above and below them the cornea was opaque and vascular, but not much elevated. The surface of the masses was rough and warty in appearance and not as vascular as the remainder of the cornea. His vision in that eye was reduced to shadows. The other eye was normal.

I operated at the hospital under cocaine anæsthesia, scraping off all the opaque material and then cauterizing the roughened places with the galvano-cautery. I found the proliferation was entirely epithelial, removing easily from Bowman's membrane and not affecting the substantia propria. The lumps were rather hard and came off in large pieces. Unfortunately the nurse destroyed the specimens, so I could not examine them microscopically.

The surface healed readily, leaving the epithelium somewhat irregular, with a slight, diffuse opacity. The eye became quiet and the vascularity disappeared. Two years later, when I examined him, I found the eye normal in appearance, except a slight opacity and irregularity of the surface of the cornea. The vision in that eye was $^{6}/_{22}$, with a + 2.D. sph.

A point worthy of notice in this case is the etiology. It occurred after the removal of a pterygium, and its growth was probably furthered by the irritating applications made to it. At a recent meeting of the Chicago Ophthalmological Society Dr. Wilder presented a case having a similar history and almost like it in appearance. There had been a pterygium removed a few months before, following which the growth made its appearance. He was able to improve the conditions by removing it, so the vision increased from the perception of shadows to $^{20}/_{100}$. Dr. Payne of San Francisco reports a case similar to this in a man aged 33, who had worked in a smelter where he had been exposed to the dust and irritating fumes. His eye trouble had existed twelve years. He had a diffuse epithelial deposit covering almost the entire cornea, but

thickest near the center, where it appeared very uneven, in some places lumpy. Around the margin it appeared flat and almost transparent.

The second case, Mrs. J. M., aged 39, came to my office in October, 1900, with the following history: Her eye trouble began when a child of two years, with a severe inflammation lasting several months. Since that time at intervals she had had attacks of inflammation of the eyes, lasting one or two days and then subsiding. She was able to do her school work and later the duties of the house, as sewing, etc., although with difficulty at times, until about six months before coming to me, when she became unable to read. Her general health had always been good, and she appeared strong and healthy with the exception of her eyes.

She had a great deal of photophobia, and the light caused her severe pain. The lids were heavy and thickened, and she was unable to open them well. The ptosis was probably caused by her having kept them partially closed so long. The conjunctiva was about normal. Some ciliary congestion was present, and on each cornea were several translucent, whitish spots considerably raised above the surface. They were about the size of a pin-head, or a little larger, the left cornea having the greater number. The spots were superficial and probably located on the site of former ulcerations. Most of the remainder of the cornea was transparent, but at the upper part of each cornea was a leucoma — more dense on the left eye. She could count fingers at ten feet with either eye, and her vision could not be improved either by glasses or dilation of the pupils.

I operated the next day, under cocaine anesthesia, on her right eye. Most of the spots separated easily from the cornea, not extending deeper than Bowman's membrane. One spot near the scleral margin extended beyond the limits of Bowman's membrane into the deeper layers, leaving a rough surface after removal. Healing took place readily, the epithelium forming over the denuded spots, with no marked infiltration into the deeper structures, except at the spot near the margin. What infiltration there was gradually disappeared until only a slight opacity marked the sites of the former spots.

Two weeks later I scraped the opacities from the left eye, but found it more difficult than the right. Several of them were near the corneal margin, so they did not separate well from the underlying tissue. Healing took place readily, as in the other eye, but more opacity remained. Two weeks later, when she returned home, her vision was $^{6}/_{15}$ in her right eye and $^{6}/_{22}$ in the left.

She returned the latter part of January, this year, with her eyes greatly improved. The photophobia and lacrymation were largely gone, but the eyes would become congested on handling. There was some opacity where the spots formerly were, and some irregularity of the corneal epithelium. The eyelids were heavy, and the ptosis could not be overcome even by extreme effort. Her vision was $^{6}/_{12}$ in the right eye, with a + 3.D. sph., and in the left $^{6}/_{15}$, with a + 2.D. sph.

In this case we probably have a hyaline infiltration underneath the hypertrophied epithelium at the sites of the old ulcerations. That the condition is rare would be shown by the fact that when I presented the case before the Chicago Ophthalmological Society no one had seen a similar condition.

Nuel has described the condition and gives a cut of the microscopical appearance in his article on Diseases of the Cornea in the Norris and Oliver System of Diseases of the Eye. In that specimen the hyaline infiltration is under the epithelium and is infiltrated with calcareous material.

In the following case the degeneration affected all the layers of the cornea. The calcareous precipitate in the superficial part was probably a later development.

Miss O. S., aged 19, came to my office in July, 1900, to consult me regarding an operation to improve her sight. She gave the following history: Her eye trouble dated from a severe inflammation when she was 7 years of age. Her eyes were never strong after that, but she was able to do her school work until six years later, when she had an inflammation lasting several months. This left the eyes in bad condition and she would have frequent attacks of inflammation lasting one or two days. Her general health had been good, but her color was pale and waxy, and she had very little endurance.

There was a great deal of irritation of the eyes and photo-

phobia. The palpebral conjunctiva was about normal, but there was some circum-corneal congestion and lacrymation. The cornea was full of fine, whitish dots, some of them so small they could only be seen with a strong lens. Apparently the whole thickness of the cornea was involved, but they were most dense in a circle about the pupil in each eye. At this point they were larger and more superficial and gave a slightly uneven appearance to the surface of the epithelium, which was smooth over the remainder of the cornea. The larger spots looked like deposits of some foreign substance, as lead or chalk. Her vision was $^{6}/_{30}$ in the right eye and $^{6}/_{45}$ in the left. Under atropia it improved to $^{6}/_{30}$ in each eye. The fundi were normal as far as could be seen.

Hearing that she had consulted Dr. Westcott a few years before, I saw her in consultation with him, and he gave me the following notes from his record: He saw her in May, 1897, when she complained of the eyes watering and being sticky in the morning, and of headache over the eyes. The conjunctiva was roughened and the cornea was dotted with very fine opacities, apparently superficial. The vision was $^{20}/_{50}$ in each eye, and under atropia with a correcting glass it was slightly improved. He said the spots in the cornea were much larger and more numerous than when he first saw her.

I scraped the central opacities from the left cornea with a curette as thoroughly as possible. They came off in chunks like grains of sand, leaving holes quite deep in the cornea. I was able to remove most of the larger spots, but some were so firmly imbedded in Bowman's membrane or below it that I did not think it best to dig so deep for them. The epithelium re-formed surprisingly well, leaving the surface quite smooth but with slight opacity where the spots were removed. Eight days after the operation her vision was $^{6}/_{15}$ and with a + 75 D. cyl. $= ^{6}/_{12}$.

About a month later I operated on the other eye and obtained an equally good result, so that a few days after her vision was $^{6}/_{12}$ with each eye. The larger white spots which formed the ring about the pupil were mostly removed, but some of the deeper ones remained.

Grönouw reported two cases that were similar to this in their clinical appearance, both eyes being affected. He had

watched one case for ten, the other for eleven years, with no marked change except the gradual increase in the size and number of the spots. In one case—a man, aged 50—the margin of the cornea was quite clear, while the center was filled with a great number of gray opacities. They were irregularly round; part of them were separate and part in groups. The larger ones were the size of a poppy seed, with smaller ones between, and some fine stripes and lines between the opacities. They were in all layers down to Descemet's membrane. There was no inflammation and very little circumcorneal congestion. His vision decreased from $^{2}/_{5}$ in 1889 to $^{3}/_{60}$ in 1897. In the second case—a girl, aged 17—the opacities were in the central part of the cornea and were more dense than in the other case. The epithelium was raised and uneven in the center but not in the other parts of the cornea. The small spots extended through to the deeper layers. He removed some of the cornea for microscopical examination, as I shall mention when discussing the pathology.

As to the cause of this trouble we know very little. That in the first case the pterygium and the subsequent irritating treatments were a factor there can be no doubt. In the second case we have the trouble beginning as a probable sequel of a corneal ulceration, with the irritation of subsequent recurring inflammations. I have seen two cases in consultation with other oculists, where a previous ulceration was given as the cause of a hyperplasia at one point, similar in appearance to the spots in this case—only larger. It is not so easy to understand the cause of the third case. Any inflammation severe enough to interfere with the nutrition of the cornea and produce the changes in the corneal cells should have left some other mark. Of the two cases, similar to this, reported by Grönouw, one had had a mild inflammation of the eyes prior to the development of the trouble, but the other had never had previous trouble.

Nettleship considers cardiac and kidney trouble, as well as the gouty diathesis, as probable causes of the form of degeneration known as "Band-Shaped Keratitis," while Galezowski found phosphaturia present in three cases of calcareous infiltration of the cornea, and considered it the cause.

In my statement of the pathology I shall have to depend

more upon the reports of the cases quoted than upon my now examinations. I saved the specimens from the second case, but they were very small, and so hard that it was impossible to make good sections. They appeared to be a hyperplasia of the epithelium which had undergone some change, with probable calcareous infiltration, but the sections were not thin enough to make the differential stain. The methods of staining for the differentiation of hyaline have been so varied that it is hard to reconcile their results. According to the latest authorities on pathological technique, the old methods of staining were unreliable and frequently gave contrary results. Whether the new differential stains will cause us to modify the statements made regarding hyaline degeneration remains to be proved. For instance, Fuchs found that a hyaline degeneration was one of the principal changes in the pinguecula. He arrived at quite different results, however, than v. Recklinghausen in his work on that subject.

The pathological conditions in my cases were very probably similar to those occurring in band-shaped keratitis, and described by Treacher Collins as follows: A formation of laminated fibrous tissue is present at the anterior part of the cornea between the epithelium and the normal situation of Bowman's membrane, which in most cases contains a granular material, either collected in masses or more loosely distributed in the epithelium. No blood vessels are found in this new fibrous tissue. Granular hyaline or entirely granular bands are found at the posterior part of the new tissue, in some cases forming a sharp line between it and the substantia propria. Where the hyaline granular bands exist Bowman's membrane is never found in contact with the epithelium. These bands may be found directly continuous with Bowman's membrane, so there can be no doubt that they are portions of it which have become granular and divided up. Degenerative changes are found in the epithelium in the region of the film. Calcareous material was found in all the cases examined.

Grönouw found in the case he examined, which was like the last one I reported in clinical appearance, that there were round masses and stripes of a transparent homogeneous substance lying under the epithelium and in the substantia propria. The spots were colored intensely red by eosin, stained

a light brown with iodine, and did not change on the addition of acids corresponding to the tests for v. Recklinghausen's hyaline. He thought that the smallest opacities seen in the cornea were caused by the changed corneal cells, as they were so swollen that the nuclei would not stain. It is probable that these were the beginning of changes from which the hyaline substance is developed. Fuchs, in his article on Superficial Punctate Keratitis, also takes the view that the fine spots seen in the cornea are the swollen corneal cells.

Following the hyaline degeneration we frequently have a deposit of lime salts. This is particularly noticeable in band-shaped keratitis, occurring as it frequently does in old, degenerated eyes, following injury or glaucoma.

As to treatment, nothing is of benefit except removal of the degenerated tissue when it is superficial. The thorough removal of the abnormal tissue has been followed by the formation of normal epithelium in all the cases I have seen, with the attending of the irritation and congestion. In those cases affecting the deeper layers of the cornea, with calcareous infiltration near the surface, some benefit may be obtained by scraping out the most superficial deposits. That they will return later is very probable.

Since writing this paper I have had a case similar to those reported, but developing more rapidly. About six months ago the woman had an ulceration of the cornea, which started at the margin and extended quite a distance. Following the ulceration the eye remained irritable and the opacity grew more dense. On the temporal side of the cornea, extending nearly to the pupil, was an opacity, raised slightly above the surface, part of which was translûcent and quite vascular, and part of it being infiltrated with a white material, probably calcareous. There was some circum-corneal congestion and the eye was quite irritable. It will probably be necessary to scrape the surface thoroughly before the eye will become quiet and not give trouble.

The preceding cases show that we may have, in otherwise healthy eyes, a hypertrophy of the corneal epithelium, associated with a degeneration, simulating in its appearance a new growth, and that this hypertrophy may be removed, leaving a serviceable eye.

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DISCUSSION.

Dr. Ayres, Cincinnati.—I have been very much interested in this subject. These cases constitute a group distinct from the ordinary corneal diseases. I have had some cases where I scraped the cornea, but whether there was hyaline degeneration or not I am unable to say. The first case I will mention is that of a lady who came to me last October. In August she had an inflammation from which she apparently recovered and then relapsed, and when I saw her there was in the center of this old scar a depression and one of those necrotic processes which are slow to heal. The eye was sensitive and painful. These are the cases where curetting and scraping are followed by very excellent results. I curetted the cornea and removed the necrotic tissue. It did not appear, however, to be calcareous, but the removal of this tissue was promptly followed by a restoration of the epithelium and the surface healed over. I had last year an interesting case of injury to the cornea. The gentleman was thrown from his carriage and two or three days after suffered from pain in the left eye. Examining it, first I could see no wound, but the eye was very painful. I ordered cocaine locally. The next day the epithelium over the center of the cornea was elevated. On the following day I tore off this epithelium around to the healthy epithelium and kept the eye bandaged, and in a short time the epithelium was restored. That probably was traumatic, the trouble arising from the fall from the carriage. The next is the case of a young man in the city. A few

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years ago he came in with a violent inflammation. There were greyish spots in the epithelium of the cornea. In a short time these spots enlarged and coalesced, the epithelium came loose, first in one eye and then the other, and was completely shed in both eyes. The restoration of the same was very rapid. I think it was only a few days until the eyes were in good condition. Allied to this is the bullous keratitis found in old, glaucomatous eyes which have been blind for a long time. I had a case of a man 75 years of age who had been blind five years, and for several months he had had a violent pain in the left eye. I first removed the blebs and then applied a 40 per cent. solution of silver nitrate over the cornea, and up to five weeks ago there was no return of the pain nor had the blebs reformed.

Dr. Adolf Alt, St. Louis.—I have had occasion to examine quite a number of such cases, and a drawing of one can be found in my book on the histology of the eye. I have also a specimen, sent me by Professor E. Fuchs of Vienna, in which there is a hyaline degeneration which affects the anterior layers of the cornea. The epithelium is not normal, but it does not show the hyaline degeneration. Lime deposits, which stain very much like hyaline substance, can easily be recognized by the application of an acid. The doctor is to be congratulated in view of the results of his treatment.

Dr. Phillips, Chicago.—One of the cases Dr. Dodd reports I had the pleasure of seeing, and I can state that the appearance of the diseased area was that seen in Arcus Senilis, except its occurrence in spots and as distinct elevations on the surface. I also saw a second similar case under the care of Dr. Wilder, and presented to the same society. A microscope examination was made of the tissue removed in this case, and it was found, I believe, to be hyaline degeneration. I have not seen Dr. Wilder's statement in regard to the final examination. The cases were similar, with the exception that in Dr. Wilder's case a larger single area of the cornea was involved. From my experience I can say that Dr. Dodd's case had none of the appearances of keratitis filamentosa.

Dr. Dodd, Chicago.—I am very much obliged to the gentlemen for discussing the paper, because it is rather out of the

ordinary, and I was very much at sea when I first saw these cases as to where to class them. As regards its being similar to fascicular keratitis, I do not think it is. I think a number of these conditions aside from what I have mentioned should be classed in the same group—the clinical appearance differing a little, but the general conditions being alike.

THE THERAPEUTIC VALUE OF ADRENALIN CHLORID.

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IN undertaking to present some of the evidences of the therapeutic value of adrenalin, I feel obliged to limit myself to personal experience. Twelve hundred and twenty-two experiments form the basis of this report; most of the experiments were made at my clinic, at the Hospital College of Medicine.

My first experiment was with a case of muco-purulent conjunctivitis. After cleansing the conjunctiva with a solution of borax, I instilled one drop into each eye of the adrenalin solution in distilled water, 1 to 10,000. In less than one minute the eyes were perfectly clear and free from any sign of vascular injection. This condition remained twenty-two minutes, when it was noticed the vessels were beginning to dilate. The full effect of the drug did not pass off, however, until forty-five minutes had elapsed.

The next case was a foreign body in the cornea, which had remained twenty-four hours. The eye was very red and watery, with morbid sensibility to light. One drop of adrenalin solution in distilled water, 1 to 10,000, cleared up the eye completely in three-fourths of a minute. A solution of cocaine was instilled, and the foreign body removed. At the end of one hour the eye was still clear and free from irritation. The patient did not again return.

M. S., æt. 43, kerato-cyclitis, from a blow received in

the eye. Tension +, eye very red, painful, and with profuse lacrymation, photophobia, striated interstitial opacity of the cornea obscuring the pupil. One drop of the adrenalin, 1 to 5000, in normal salt solution, reduced the tension, and dissipated every manifestation of vascularity within one minute. Twenty-four minutes after the application the first sign of returning vascularity appeared. The photophobia and lacrymation ceased before the end of the first minute. No other local treatment was applied.

January 15th, patient returned with decided improvement in the condition of the eye. Another application of a single drop of the adrenalin solution was made and directed to be repeated every four hours.

January 16th, the eye is still more improved, and the corneal opacity much diminished. The pupillary area is now distinctly visible without illumination. Improvement continued from day to day until January 24th, when but slight opacity was visible at the inferior margin, and the vascular injection of the cornea, as well as of the conjunctiva, had entirely disappeared. This case is remarkable because the kerato-cyclitis had resisted treatment about four weeks before the application of the adrenalin.

January 25th, the patient had entirely recovered; no irritation in the eye. Sight = fingers at 3 feet.

January 14th, M. B., æt 30, tanner. On January 2d, patient received a blow in the right eye, which caused great pain and sudden loss of sight. Dr. S., who was called to see him, found the anterior chamber filled with blood, which gradually disappeared by absorption. The cornea, however, was so opaque as to render the pupil invisible. Two eminent specialists were consulted, and the treatment suggested by them was continued until all signs of irritation in the eye had ceased. The corneal opacity, however, remained.

At my first examination, January 14th, the pupil could be located by oblique illumination only. The patient was unable to count fingers at any distance. One drop of the solution of adrenalin was instilled and directed to be repeated three times every day.

February 24th, patient sees in the injured eye = $^{6}/_{24}$ Snellen.

February 28th, patient claimed to have greatly improved in vision. The opacity of the cornea was no longer visible. He now reads $^{6}/_{12}$.

March 16th, the condition of the eye seems normal. Sight $= {}^{6}/_{9} +$ Snellen.

January 15th, S. J., æt 46, syphilitic iritis of ten days' duration; gummatous nodules project from the margin of the pupil. She has been taking what is called the mixed treatment.

For the relief of the pain she was directed to have 10 grains of the salicylate of sodium in a large glass of water, to be taken every hour from 6 P.M. until relieved. The mercury was discontinued and five grains of the iodide of potassium in a half pint of water, every three hours, each dose to be followed by a half pint of fluid nourishment, was directed. The conjunctivæ were unusually injected. One grain solution of the sulphate of atropin in two drachms of water was directed to be instilled into the eyes every three hours.

January 16th, patient rested better last night after taking the salicylate. Pupils still contracted; no change in treatment.

January 18th, no apparent change being present, a drop of the 1 to 10,000 solution of chloride of adrenalin, in normal salt solution, was instilled into each eye. Two minutes afterward the eyes were pale as marble, and only the larger sub-conjunctival vessels were visible. The patient was detained for observation. Two hours afterward the eyes were still clear, and a drop of atropin solution was instilled and the patient directed to continue as before.

January 19th, the pupils are now for the first time dilated in the spaces between the gummata. Adrenalin is to be contined three times daily.

January 21st, a few points of synechia prevented complete dilatation of the pupils. The conjunctival injection was greatly diminished. There can be no doubt of the beneficial effects of the adrenalin in assisting the action of the atropin.

January 26th, patient shows no signs of iritis; the gummata have disappeared. The pupils are dilated ad max. and the conjunctival injection is entirely absent. The patient was discharged free from any sign of irritation in the eye on the 7th of February.

In an aggravated case of chronic purulent conjunctivitis, complicated with trachoma, after instilling a drop of adrenalin solution, the trachomatous bodies were crushed out, and the eye flushed with bichloride of mercury solution at intervals, the adrenalin seemingly greatly hastened recovery.

In a variety of different forms of iritis, and a large number of cases of phlyctenular keratitis, the adrenalin apparently greatly hastened recovery, and certainly improved the patient's comfort in every instance.

I have not the time nor you the patience to go further into details. I will close by summarizing some of the effects I have witnessed from its use.

First. It is a powerful hemostatic and acts promptly, generally within one minute from the time it is applied locally to mucous surfaces.

Second. Its effects persist from twenty minutes to four hours.

Third. It promptly relieves ciliary pain in all forms of keratitis, iritis, and even the cyclitis of glaucoma.

Fourth. It reduces ocular tension in glaucoma, and apparently prevents hemorrhage in iridectomy.

Fifth. It promptly clears up interstitial opacities of the cornea, following contusions, and seems to favorably modify the opacities of keratitis-punctata in cases of syphilitic iritis.

Sixth. It will in many cases so reduce the swelling in the tear passages as to allow a stream of fluid to pass from Anel's syringe through the duct without the use of a probe. In an old purulent dacryo-cystitis, the pus being pressed out with the finger through the tear sac, about two minims of adrenalin was passed in with the Anel syringe. Five minutes later a charge of chloride of sodium solution passed readily through the duct into the nose. Repeating this procedure daily prompt recovery was secured without the introduction of the probe. In a great variety of tinnitus aurium prompt and sometimes lasting benefit follows the introduction of a drop of adrenalin solution through the Eustachian catheter, blown into the tympanic cavity. A number of cases of tinnitus, without serious impairment of hearing, have been permanently relieved by two or three applications of the adrenalin through the catheter.

Seventh. In all forms of swelling in the lining of the nose prompt relief follows the application of four or five minims of the adrenalin solution sprayed into the passage. In this way the superior crypts may readily be opened, and medicated fluids sprayed into the passage, or other applications made, where access is otherwise impossible.

It renders operations in the nasal passages and elsewhere nearly or quite bloodless, and does not, as some claim, predispose to secondary hemorrhage, but has a contrary effect. The 1 to 1000 solution of adrenalin in chloride of sodium may be relied upon to relieve any case of epistaxis.

In cases of secondary hemorrhage, after operations in the nasal cavities or tonsils, an application of adrenalin solution on a cotton mop, pressed upon the bleeding surface, proves promptly efficient as a hemostatic.

The adrenalin solutions are, in every sense of the word, superior to any preparation of the suprarenal extract, or of the desiccated glands, which I have been able to procure, and I think the world is deeply indebted to Takamine for his discovery.

DISCUSSION.

Dr. Adolf Alt, St. Louis.—Parke & Davis sent me, and I suppose some of you, a half-dozen bottles of adrenalin in December last, and I have experimented quite largely. I agree with the gentleman in regard to its effect in bleaching the mucous membrane, but I fail, aside from this, to see any therapeutic value in the treatment of eye affections. Unless you use cocaine you cannot even operate painlessly. I have tried it faithfully in all sorts of diseases of the eye, and also in the ear where I thought I might help to shrink the swollen membrane, but in the latter I did not succeed. Adrenalin will, furthermore, deteriorate even when the bottle is not opened. At least my solutions all show a fungus growth now, and they do not act by far as promptly as they did in the beginning. Only a few weeks ago I tried to demonstrate its action in the German Medical Society of St. Louis, with no success whatever. Still, I think the fresh solution acts promptly as a vaso-constrictor, and is therefore of some value in rendering operations on mucous membranes bloodless, or at least less bloody.

REPORT OF A CASE OF GLIOMA OF THE RETINA.

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THE patient in the case, I wish to report, was a six-year-old boy, raised at Olathe, Kansas, who had previously been apparently healthy. When I saw him the parents had for some time noticed the yellowish or whitish-red light, which is known as the amaurotic cat's-eye, especially in a room not well illuminated. This condition remained unchanged for quite a while. The parents had no suspicion that anything was wrong with the child until the vision in the left eye began to fail; then they realized that something must be wrong, and sought the aid of a physician, who did not recognize the real nature of the case.

The eyeball increased in size for a time, then it began to shrink. Thinking that another physician might understand the case better, they discharged the one that had been treating the case. The physician who followed gave them encouragement by telling them he could cure the case in a short time and that the former doctor had not given the proper treatment. But it was only a short time until the eye began to enlarge again, glaucoma setting in, accompanied with great pain. This the doctor was unable to control, and Dr. McCall was called in consultation. The doctor found panophthalmitis of such a degree that it threatened the integrity of the eyeball. He recommended that the child be taken to Kansas City to have the eye enucleated.

The patient was brought to me on May 1st. He was a bright boy, well nourished, and had lost but little flesh. His parents were of German descent, healthy, and gave no history of any ancestors having had glioma or any other malignant trouble. When I first saw the patient he was suffering with a great deal of pain. His eyeball was staphylomatous and filled with pus. The only thing left to do was to enucleate the eye, which I did, merely expecting to relieve the suffering temporarily. After dividing the tendons of the recti muscles, with curved forceps the optic nerve was seized from

the nasal side of the orbit, drawn far forward and severed as far back as possible with enucleation scissors inserted at the temporal side of the orbit, in hopes to remove all the malignant cells. In this we failed, because the disease had extended into the optic nerve beyond where it was severed and also into the surrounding tissue in the posterior part of the orbit. Knowing that the condition was certain to return in a short time, I informed the parents of this. Two months later the case returned to the city with the growth beginning to extend beyond the eyelids. Thinking that a picture might be appreciated in the near future, I requested the father to allow us to photograph the patient, which he granted. The patient had become hard of hearing in the left ear and also complained of toothache, especially in the lower teeth of the same side. I found that this was due to pressure caused by infiltration of the malignant cells into the upper jaw, gums and surrounding tissue, including submaxillary and parotid glands on that side, causing a certain amount of swelling, especially in the gums. I called Dr. Sullivan, a dentist, to examine the teeth, who agreed with me that the pain was not due to the teeth but was a reflex pain due to the pressure upon the superior maxillary nerves.

The father said: "O, Doctor, do something for my child!" I told him that I could do nothing only to use palliative remedies to relieve the suffering, that the case was beyond all human skill, but if he thought any one could do anything to help his child to try him. He consulted several colleagues but received no encouragement from them, their prognosis being the same in each case.

They returned to Olathe, where the condition went from bad to worse. The tumor increased at a rapid rate. Then a tumor about the size of an orange formed on the left knee, as also several small ones in other regions, yet the vital organs did not seem to be affected. The cachexia at this time was marked. The patient was at all times conscious and was so until death ended his suffering, which extended over a period of about five months from the time I first saw him.

I feel it to be my duty to acknowledge my indebtedness to Dr. McCall for kindly assisting me in the operation and getting a picture for me at the close of the case.

DISCUSSION.

DR. ADOLF ALT, St. Louis.—These cases are of the worst ones we have to deal with, especially when we get to see them at such a late stage that there is nothing to be done. However, it is gratifying to know that if we see them early enough we can sometimes by prompt action save life. Quite a number of such cases are now on record, and I have had also a number of cases in which the early removal of the affected eye has saved life. The worst cases, however, are those of binocular glioma. I have reported elsewhere the case of a little girl about one year old who was brought to me with glioma of the retina in one eye. I got the parents' consent to remove the eye, and this little girl is now a young lady and came to see me the other day to get glasses for the other eye. She is perfectly strong and healthy. A year after this eye had been removed they brought her sister, fearing the same trouble. To my dismay I found she had glioma in both eyes. I told the parents the question was simply the saving of life by removing both eyes. They would not consent, and the child died in five or six months after terrible suffering. As I said, if we see the cases early enough and get the consent of the parents to remove the eye, we have by prompt action the occasion of saving a life once in a while. I think that almost every oculist has seen a number of such cases.